GRADALL®

Service Supplement

Part Number 82104003

D152/D154

S/N D152000001 & After

S/N D154000001 & After

Revised
February 10th, 2020

This manual, and all manuals for the Gradall Hydraulic Excavator product line, can be viewed or downloaded, free-of-charge, at www.mygradall.com

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GRADALL®

Operator & Safety Manual

Keep this manual with machine at all times.

D152/D154

S/N D152000001 & After

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82104002

Revised
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Gradall is a registered trademark for hydraulic excavators, industrial maintenance machines, attachments and other components manufactured and marketed by Gradall Industries, Inc.

REVISION LOG

August 31st, 2015 - A - Original Issue of Manual

November 5th, 2015 - B - Added Section 5; Swing Brake Spec to Section 7

March 8th, 2016 - C - Revised torque specs on page 5-5; added torque spec for D154. Revised D152 specs on page 7-2; added specs for D154. Added s/n range for PTO indicator on page 2-13.

October 12th, 2016 - D - Revised control scheme on pages 2-18, 2-19, 2-20 & 3-10. Revised dig brake application parameters on page 3-4. Revised remote driving procedure on pages 3-6 thru 3-8.

February 10th, 2020 - E- Op Manual Revision Log

This manual is a very important tool! Keep it with the machine at all times.

The purpose of this manual is to provide owners, users, operators, lessors, and lessees with the precautions and operating procedures essential for the safe and proper machine operation for its intended purpose.

Due to continuous product improvements, Gradall Industries, Inc. reserves the right to make specification changes without prior notification. Contact Gradall Industries, Inc. for updated information.

Operator Qualifications

The operator of the machine must not operate or drive the machine until this manual has been read, training is accomplished and operation of the machine has been completed under the supervision of an experienced and qualified instructor.

Operators of this equipment must possess a valid, applicable driver's license, be in good physical and mental condition. Operator must not be using medication which could impair abilities nor be under the influence of alcohol or any other intoxicant during the work shift.

In addition, the operator must read, understand and comply with instructions contained in the following material furnished with the hydraulic excavator:

- This Operator & Safety Manual
- AEM Off-Highway Dump Truck Manual
- EMI Hydraulic Excavator Safety Manual
- All instructional decals and plates
- Any optional equipment instructions furnished
- OEM Chassis Manual

The operator must also read, understand and comply with all applicable Employer, Industry and Governmental rules, standards and regulations.

If any manual is missing or illegible, get a replacement from your employer, distributor, or from Gradall Industries.

Modifications

Any modification to Gradall products must be approved by Gradall.

This product must comply with all safety related bulletins. Contact Gradall Industries, Inc. or the local authorized Gradall representative for information regarding safety-related bulletins which may have been issued for this product.

Gradall Industries, Inc. sends safety related bulletins to the owner of record of this machine. Contact Gradall Industries, Inc. to ensure that the current owner records are updated and accurate.

Gradall Industries, Inc. must be notified immediately in all instances where Gradall products have been involved in an accident involving bodily injury or death of personnel or when damage has occurred to personal property or the Gradall product.

FOR:

- Accident Reporting and Product Safety Publications
- Current Owner Updates
- Questions Regarding Product Applications and Safety
- Standards and Regulations Compliance Information
- Questions Regarding Product Modifications

CONTACT:

Product Safety and Reliability Department
Gradall Industries, Inc.
406 Mill Avenue
New Philadelphia, OH 44663
Phone: 330-339-2211
Toll-Free: 1-800-445-4752

Other Publications Available

Illustrated Parts Manual.....82104001

Service Supplement 82104003

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Read This First

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SECTION 1 - GENERAL SAFETY PRACTICES

1.1 HAZARD CLASSIFICATION SYSTEM

Safety Alert System and Safety Signal Words



OW0010

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



OW0021

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



OW0031

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

1.2 GENERAL PRECAUTIONS

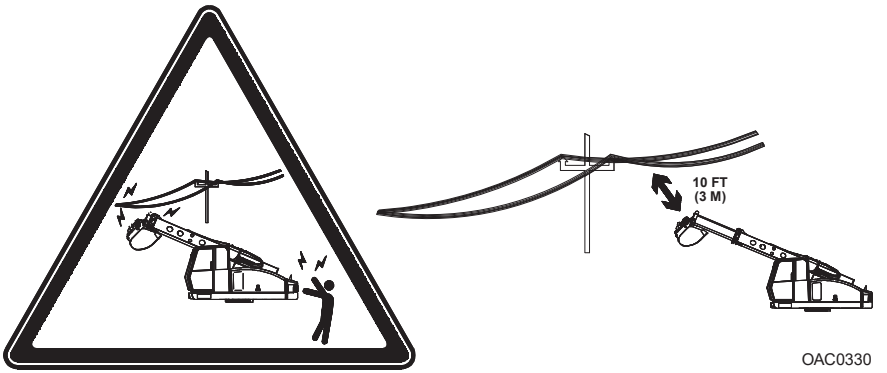


OW0021

Before operation, read & understand this manual. Failure to comply with the information in this manual could result in machine damage, property damage, personal injury or death.

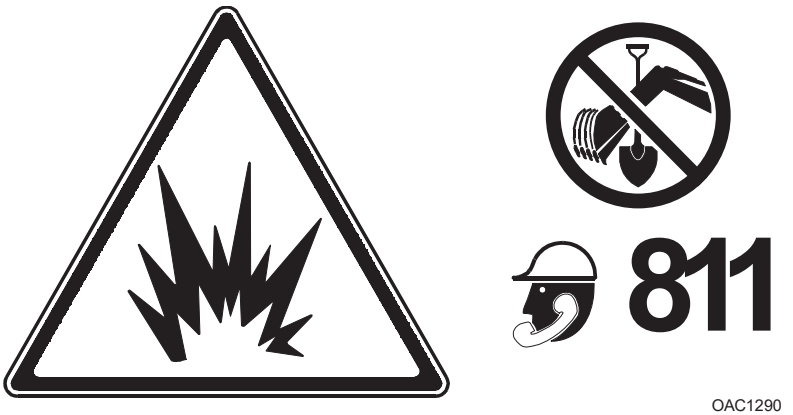
1.3 OPERATION SAFETY

Electrical Hazards



OAC0330

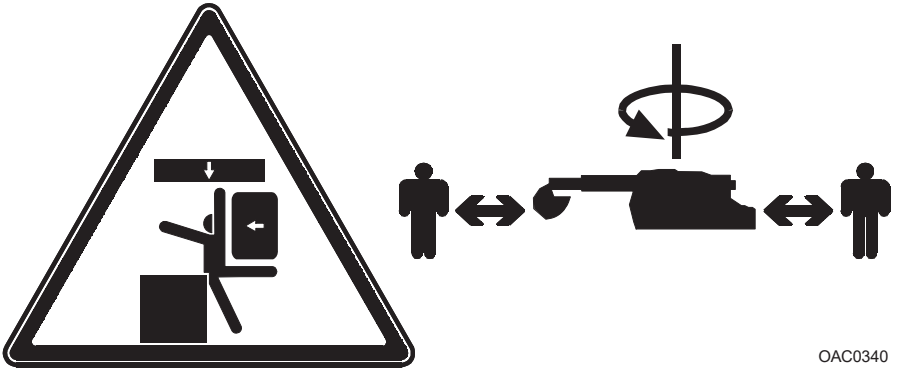
- This machine is not insulated and does not provide protection from contact or being near electrical current.
- **NEVER** operate the excavator in an area where overhead power lines, overhead or underground cables, or other power sources may exist without ensuring the appropriate power or utility company de-energizes the lines.
- Always check for power lines before raising boom.



OAC1290

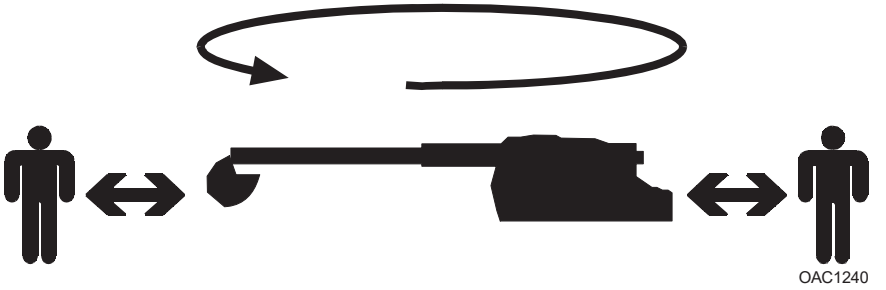
Always **"Call Before You Dig"**. Contact your local One-Call (811 in USA) or the One-Call referral number (888-258-0808 in USA and Canada) to have underground utilities located before digging.

Swing Hazards



OAC0340

- Keep others away from machine while in operation. Ensure others are clear of the swing radius prior to swinging upperstructure.
- Never carry a water can, equipment, or other worker's tools or personal items on the machine.
- Never permit anyone close enough to machine to become trapped between undercarriage and upperstructure.
- Position machine to prevent possibility of a person being crushed between counterweight and another object.
- Do not allow anyone inside the cab(s) (other than the operator) while in operation.
- Always be careful when using mirrors; distances are distorted and field of view is limited, especially when swinging. Always use a signal person when working in tight quarters.
- Be aware of undercarriage cab, if equipped, and undercarriage components when swinging upperstructure or digging. Position unit so that it won't be necessary to swing boom close to cab or undercarriage components.



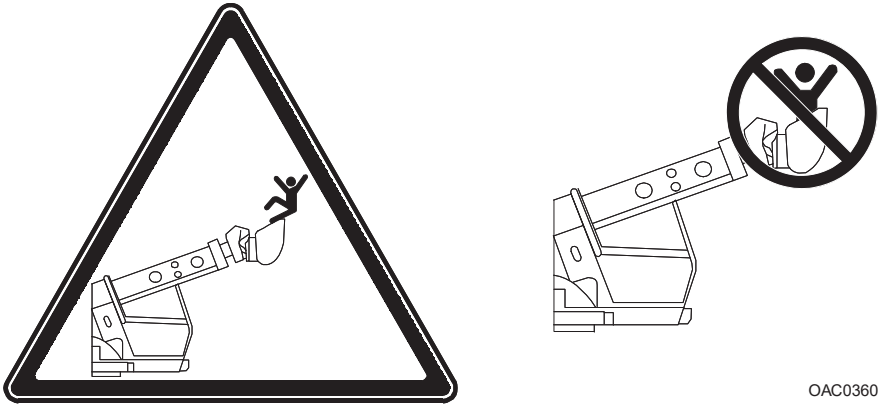
- The circle of safety is a circle around the excavator with the boom at full extension.
- Establish and inform others of the circle of safety. Keep others from entering into the circle of safety.

Slip and Fall Hazard



OAC0350

- Always maintain 3-point contact using proper hand holds and steps provided when mounting or dismounting. Never grab control levers or steering wheel when mounting or dismounting machine.
- Repair or replace damaged steps and grab handles.
- Keep grab handles, steps, and walkways free of mud, oil, grease and other foreign material. Replace non-skid surface material as required.
- Do not get off machine until shutdown procedure has been performed.
- Align upperstructure with undercarriage before dismounting.



OAC0360

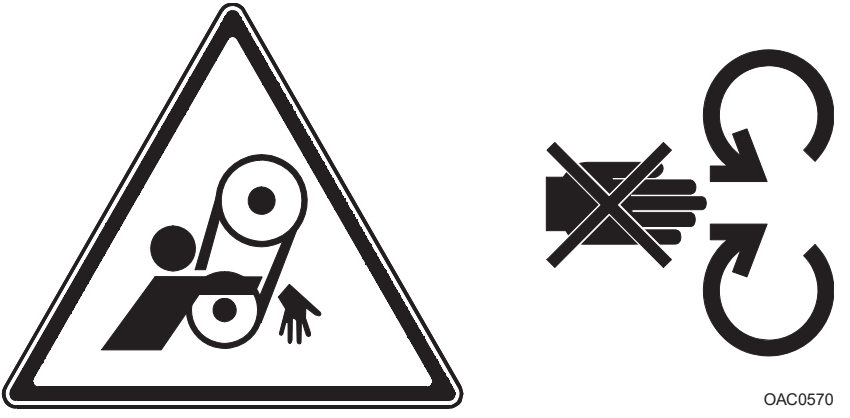
- **Keep others off machine** while in operation.
- **Do not lift personnel with this machine.**

Crush Hazards



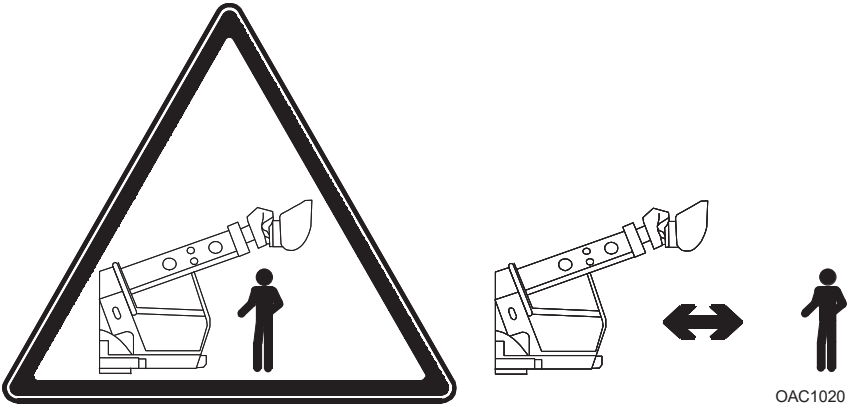
OAC1250

- Do not lean on boom or reach into boom holes, bucket linkage or boom rollers until the attachment or boom is resting on the ground and the engine is stopped.
- Be sure all access covers are in the fully open position before performing any procedures inside compartments.



OAC0570

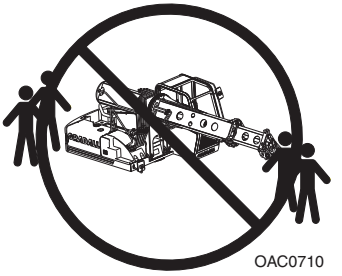
- Stay clear of moving parts while engine is running.
- Rotation of undercarriage cab steering wheel will occur during remote steering operation. Do not occupy undercarriage cab during remote operation.



OAC1020

- Never permit anyone under boom, attachment or load. Rest boom or attachment on ground and stop engine before permitting anyone to work beneath boom or behind cradle.

Travel Hazards - Remote and Driving


OAC0710

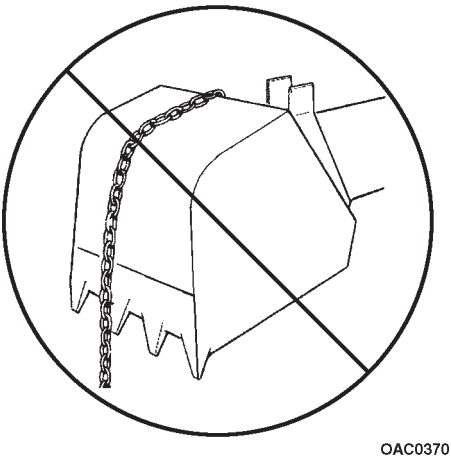
- Look out for and avoid other personnel, machinery and vehicles in the area. Use a spotter if you **do not** have a clear view.
- **Before moving** be sure of a clear path for undercarriage, boom and counterweight and **sound horn.**
- **Always** look in the direction of travel.
- **Before remote travel, check to be sure you are aware of orientation of upperstructure with regard to undercarriage.** Confusion could cause travel in the opposite direction you may expect.


OH20911

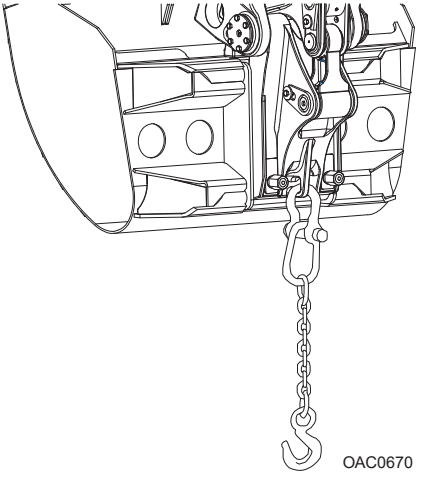
- Always wear seat belt.
- Keep head, arms and other body parts inside cab at all times.
- When machine is operating or driving on public roadways, **comply with all local, state and federal restrictions.**
- **When driving**, ensure boom and attachment are properly secured and positioned for maximum visibility and adequate clearances. Know the overall height of the machine.
- **Always check overhead and side boom clearances** carefully before driving. Position attachment/load to clear obstacles.
- Never drag boom or attachment while moving unit.

Tip Over Hazard

- Understand how to properly use the capacity chart located in cab. **Do not exceed rated lift capacity**. Plan the lift to be sure it can be performed safely.
- Maintain proper tire pressure at all times.
- Do not depend on machine tipping as a warning of overload. Some load ratings are based on hydraulic lift capacity, not stability.
- Do not increase hydraulic relief settings to lift a load.
- Sudden swing braking can cause unexpected movement of the load and tip the machine.
- Tether suspended loads to restrict movement.



OAC0370



OAC0670

- Never pass load line over open bucket. Relief valves in bucket circuit could cause unexpected, dangerous movement of the load. Bucket linkage could also be damaged.
- Be sure the surface excavator is on is firm enough to support unit and allows for adequate traction.
- Select low travel speed for off-highway grade travel. See *"LCD Display"* on page 2-8.
- Do not travel over excessively steep slopes or excessively rough terrain.
- No load in bucket, attached to boom or any other part of machine during off-highway grade travel.
- Front axle lock cylinders automatically unlock during travel. Do not travel with load over side.
- Shutting off engine will cause front axle lock cylinders to unlock. Place load on ground before shutting off engine.

Chemical Hazards

Exhaust Fumes

- **DO NOT** operate machine in an enclosed area without proper ventilation.
- **DO NOT** operate the machine in hazardous environments unless approved for that purpose by Gradall and site owner. Sparks from the electrical system and the engine exhaust can cause an explosion.
- If spark arrestors are required, be sure they are in place and in good working order.

Flammable Fuel



OW0300

- **DO NOT** fill the fuel tank or service the fuel system near an open flame, sparks or smoking materials. Engine fuel is flammable and can cause a fire and/or explosion.



OW0021

Operating, servicing and maintaining this equipment can expose you to chemicals including gasoline, diesel fuel, lubricants, petroleum products, engine exhaust, carbon monoxide, and phthalates, which are known to the State of California to cause cancer and birth defects or other reproductive harm. To minimize exposure, avoid breathing exhaust, do not idle the engine except as necessary, service your vehicle in a well-ventilated area and wear gloves or wash your hands frequently when servicing your vehicle. Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the state of California to cause cancer, birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov. This website, operated by California's Office of Environmental Health Hazard Assessment, provides information about these chemicals and how individuals may be exposed to them.

Hydraulic Fluid



- **DO NOT use your hand to check for leaks**. Use a piece of cardboard or paper to search for leaks. Wear appropriate equipment to protect yourself from spraying fluid. If fluid is injected into the skin seek medical attention immediately.
- Stop engine and relieve trapped pressure before loosening any hydraulic fitting. Hydraulic oil is under enough pressure that it can penetrate the skin.
- **DO NOT** attempt to repair or tighten any hydraulic hoses or fittings while the engine is running or when the hydraulic system is pressurized.



- Relieve pressure from the hydraulic reservoir using the vent valve near the reservoir breather before loosening the filter lid or cover.

Battery



OAC1270

- Keep sparks, flames and lighted material away from batteries. Explosive gases could cause death or serious injury.

Dust Hazard



OAC0660

- Repeated or substantial breathing of hazardous dusts, including crystalline silica, could cause fatal or serious respiratory disease including silicosis. Concrete, masonry, many types of rock, and various other materials contain silica sand. California lists respirable crystalline silica as a substance known to cause cancer. Operation of this equipment under certain conditions may generate airborne dust particles that could contain crystalline silica. In those conditions personal protective equipment including an appropriate respirator must be used. If excessive dust is generated, a dust collection or suppression system should also be used during operation.

1.4 PERSONAL PROTECTION EQUIPMENT

Wear all the protective clothing and personal safety devices issues to you or called for by job conditions. You may need:

- Hard hat
- Safety shoes
- Safety glasses, goggles or face shield
- Heavy gloves
- Hearing protection
- Reflective clothing
- Wet weather gear
- Respirator or filter mask

Wear adequate clothing for the job conditions.

Always know where to get assistance in the case of an emergency. Know where to find and how to use a first aid kit and fire extinguisher/fire suppression system.

NOTES:

SECTION 2 - PRE-OPERATION AND CONTROLS

2.1 PRE-OPERATION CHECKS & INSPECTION

Complete all required maintenance before operating unit.



OW0021

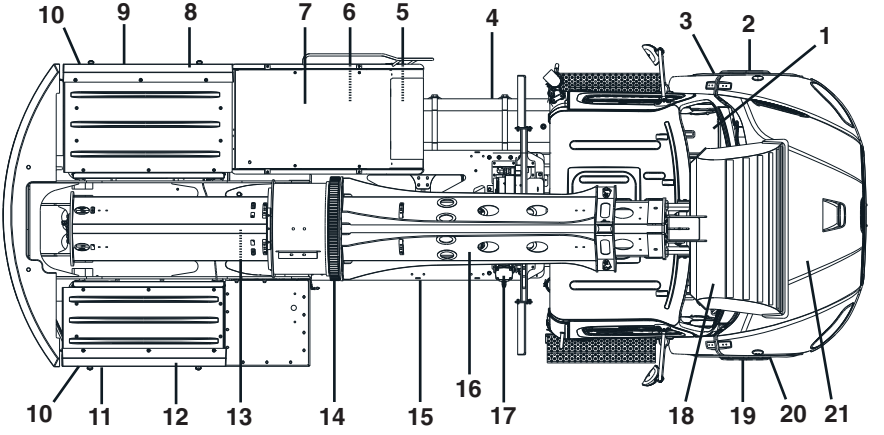
FALL HAZARD. Use extreme caution when checking items beyond your normal reach. Use an approved ladder. Failure to comply could result in death or serious injury.

Walk around inspection must be performed at beginning of each work shift or at each change of operator. **Contact your local Division of Motor Vehicles for a list of Pre-trip inspections that are recommended in the Commercial Driver's License (CDL) Manual. These inspections should be performed before the inspections on the following pages.**

- Ensure all Safety decals are legible and in place. Clean or replace as required. See page 2-5 for decal information.
- Before removing filler caps or fill plugs, wipe all dirt and grease away from the ports. If dirt enters these ports, it can severely reduce component life.
- Check all fluid levels and refill as needed.

Note: *Consult engine/chassis manufacturer manual(s) for additional engine/chassis inspection information.*

2.2 WALK-AROUND INSPECTION



Begin your walk-around inspection at item 1, as noted below. Continue to your right, checking each item in sequence.

INSPECTION NOTE: In addition to any other criteria mentioned, on all components:

- Ensure there are no loose or missing parts and that all parts are securely fastened.
- Check for visible leaks and excessive wear.
- Inspect all structural members including attachment for cracks, excessive corrosion and other damage.

1. Undercarriage Cab -

- General appearance; no visible damage; Chassis manuals in cab.
- Grab handles and steps secure and clean.
- Window glass and mirrors clean and unobstructed. Adjust mirrors for maximum visibility, before and during operation. Be sure windows and doors are securely latched in open or closed position when operating. Replace damaged latches immediately.
- Check seat belts for working condition damage, replace belt if frayed or cut webbing, damaged buckles or loose mounting hardware.

2. Front Axle - Drag link undamaged; steer cylinder and oscillation lock cylinders undamaged, not leaking; hydraulic hoses undamaged, not leaking; brakes undamaged.

3. Wheel/Tire Assembly - No loose or missing lug nuts; No damage to rims or tires; axle bolts torqued.

4. Fuel Tank - Check fuel level, refill as required; filler cap securely fastened.
5. DEF (Diesel Exhaust Fluid) Tank - Check DEF level, refill as required.
6. Battery Box - Battery cables tight, no visible damage or corrosion. Battery box cover properly latched.
7. Upperstructure Cab -
   - General appearance; no visible damage; Operator & Safety manual located in manual drawer.
   - Grab handles and steps secure and clean.
   - Window glass and mirrors clean and unobstructed. Adjust mirrors for maximum visibility, before and during operation. Be sure windows and doors securely latch in open and closed position. Replace damaged latches immediately.
   - Check seat belt (if equipped) for damage, replace belt if frayed or cut webbing, damaged buckles or loose mounting hardware.
8. AC/Heater Cover - Ensure cover is securely latched. Replace damaged latches immediately.
9. Rear Axle/Fender - Check mud flaps for proper position and condition for highway operation; brakes undamaged.
10. Wheel/Tire Assemblies - No loose or missing lug nuts; proper inflation; No damage to rims or tires; axle bolts torqued.
11. Rear Axle/Fender - Check mud flaps for proper position and condition for highway operation; brakes undamaged.
12. Main Control Valve and Cover - See Inspection Note. Ensure cover is securely latched. Replace damaged latches immediately.
13. Center Pin - See Inspection Note.
14. Tilt Gear - Properly lubricated.
15. Air Tanks - Check for damage/leaks; open petcocks to eliminate condensation.
16. Boom -
   - Rollers properly adjusted; no visible damage to boom hoses/tubes
   - Boom secure if machine is to be driven on highway.
17. Hydraulic Reservoir - Recommended fluid level on sight gauge; filler/breather cap secure and working; oil is clear.
18. Attachment - Properly installed.

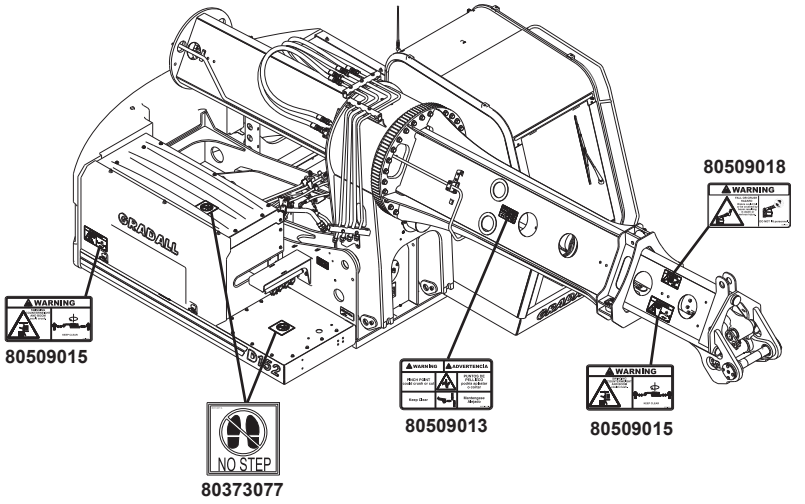
19. Engine Compartment -

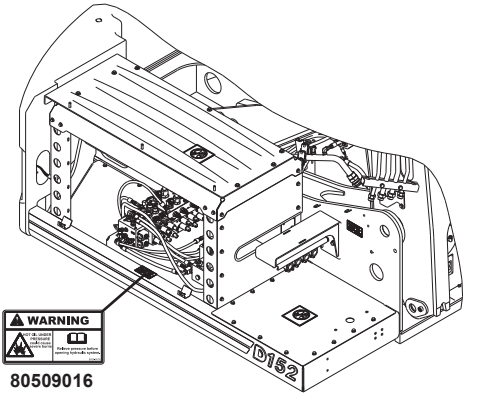
- Engine crankcase, check oil level & refill as required. Do not overfill.
- Check engine coolant level at overflow bottle and refill as required.Do not remove the radiator cap. Be sure antifreeze solution is adequate for expected temperatures. Be sure radiator and oil cooler fins are clean.
- Drive belt, check condition & replace as required.
- Power steering fluid at proper level.
- Air Cleaner element condition indicator, check for clogged condition. Replace element as required.
- Engine cover properly latched and secured.

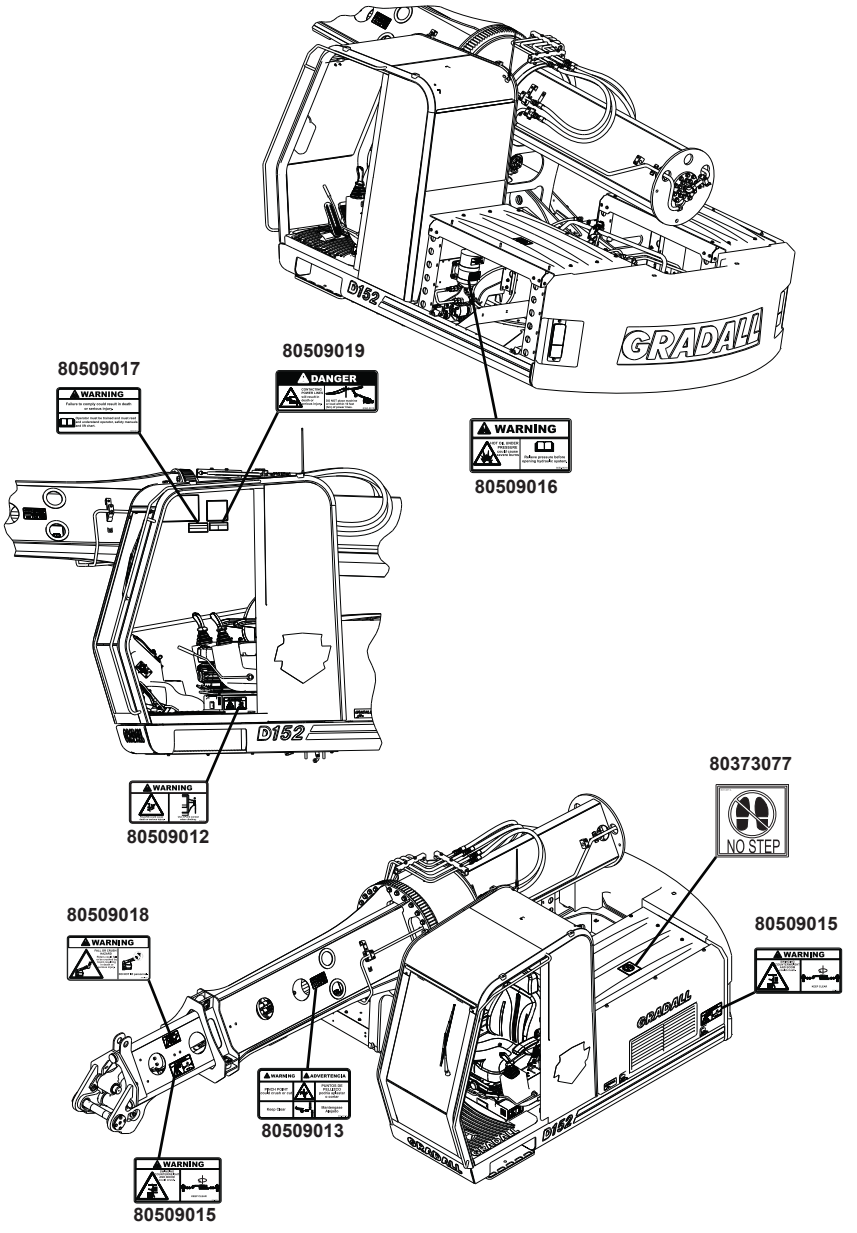
2.3 SAFETY DECALS

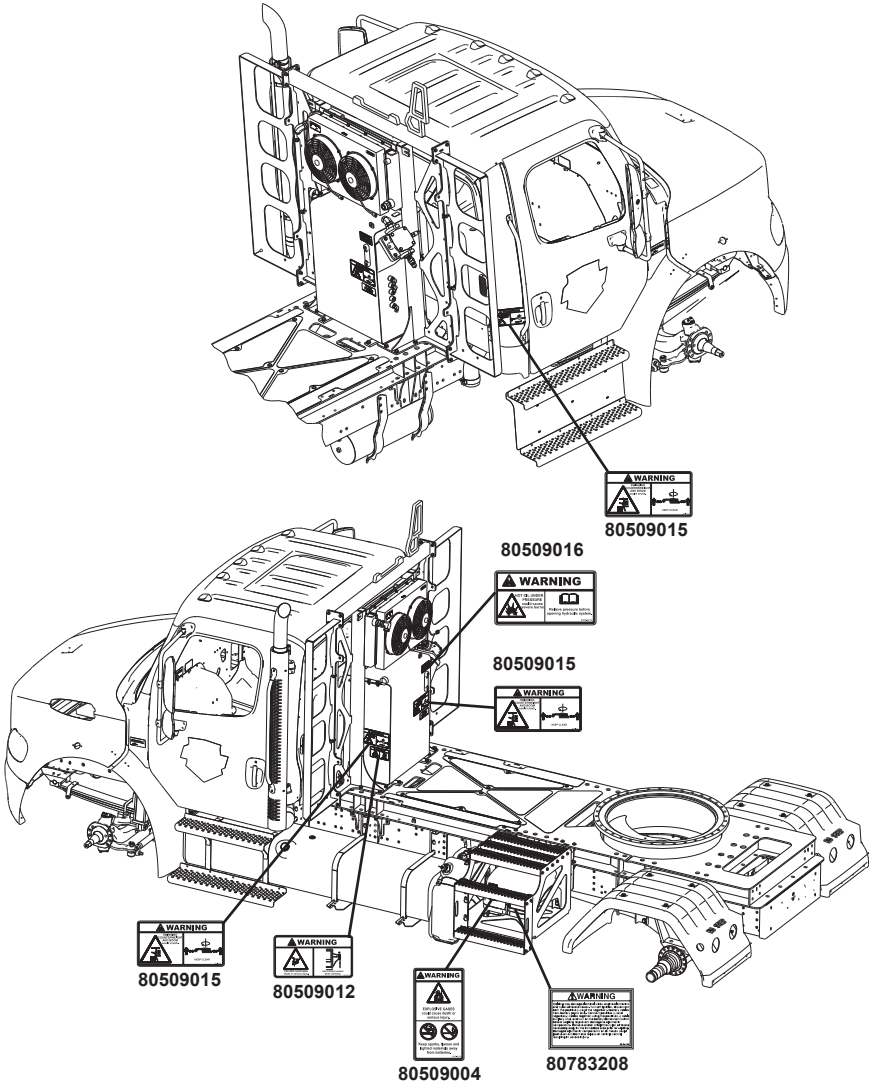
Ensure all **DANGER**, **WARNING**, **CAUTION** and instructional decals and proper capacity charts are legible and in place. Clean and replace as required.

Decal Locations






80509017
80509019
80509016
80509012
80373077
NO STEP
80509018
80509015
80509013
80509015
GRADALL
D152


WARNING
80509015
80509016
WARNING
80509015
WARNING
WARNING
80509015
WARNING
80509012
WARNING
80509004
WARNING
80783208

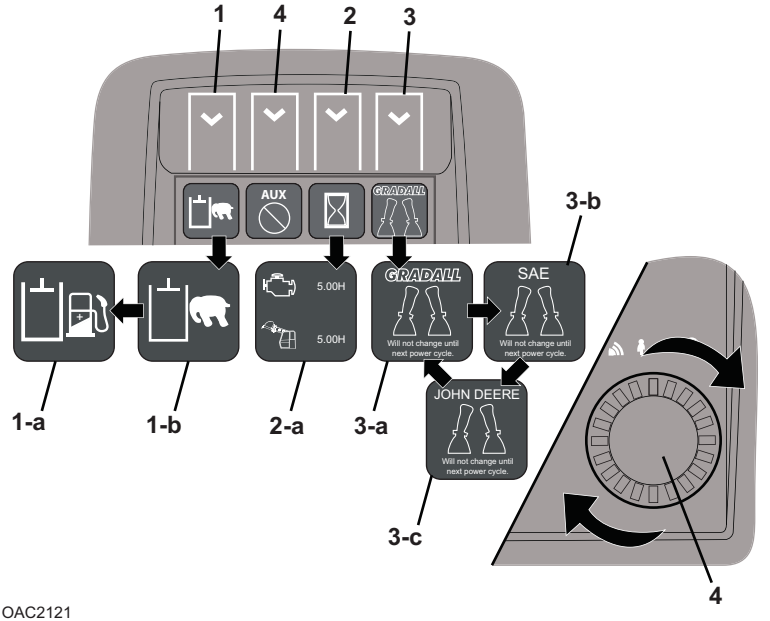
2.4 UPPERSTRUCTURE CAB CONTROLS & INDICATORS

LCD Display



OAC2111

The LCD display is a collection of controls and indicators. The following pages provide detail of how to understand and function this unit, starting at the top of the display to the bottom.



OAC2121

1. Mode Select: Press this button to toggle between fine grade mode **(1-a)** and dig mode **(1-b)**.

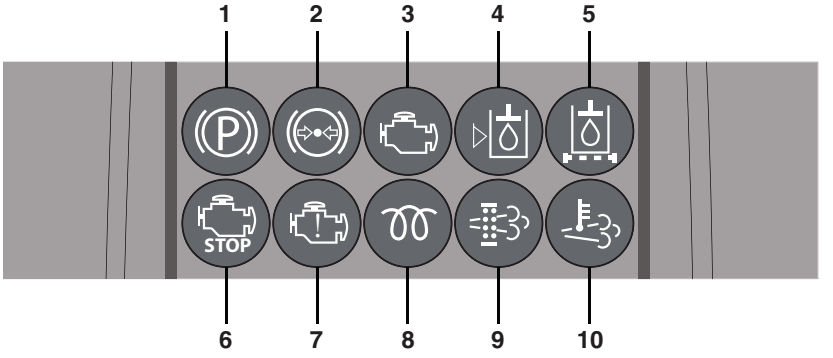
2. Hourmeter: Press this button to view the hourmeter information window **(2-a)**. Hourmeter information is separated into chassis engine hours and upperstructure hours. The window will close after a brief period of time, or press the button again **(2)** to close the window manually.

3. Joystick Control Pattern Selection: Press this button to view available control patterns. Scroll the control patterns by rotating the control panel dial **(4)**. When desired control pattern is displayed, press the Joystick Control Pattern Selection button **(3)** to confirm selection. If a new pattern is selected, controls will not change until the next power cycle.

   Available control patterns are Gradall **(3-a)**, SAE **(3-b)** and John Deere **(3-c)**. See *"Joystick Controls"* on page 2-19 for control details.

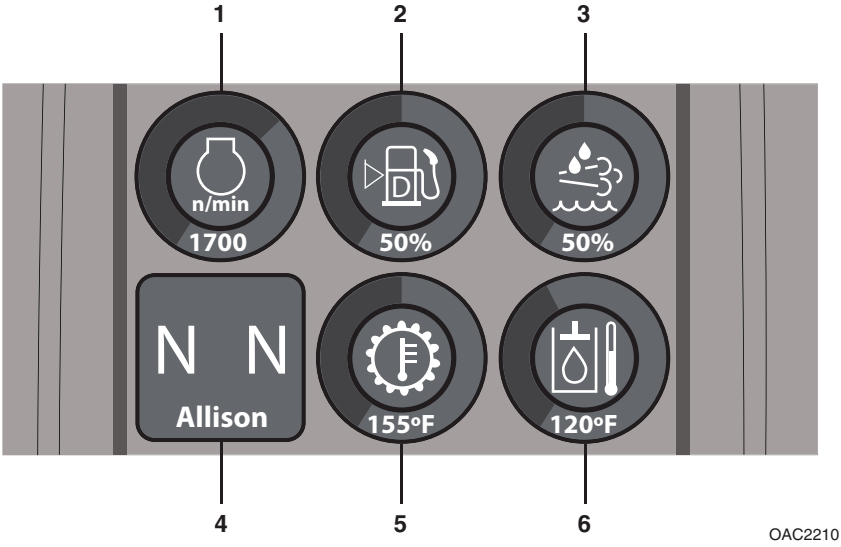
Note: *When a control pattern is changed, the corresponding control decal must be displayed in the cab.*

4. Auxiliary Hydraulics Control: See page 2-14 for details.

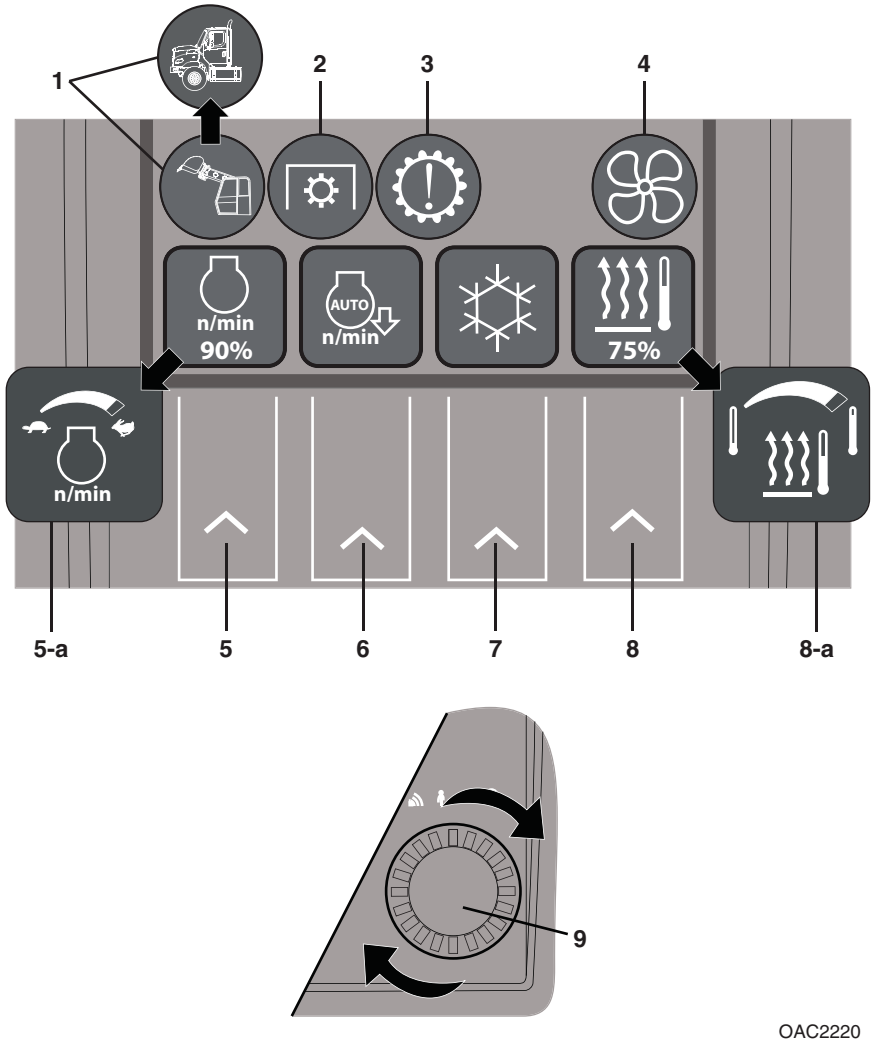


OAC2130

1. Parking Brake Indicator: See *"Park Brake Switch"* on page 2-26.
2. Low Air Indicator: Illuminates red to indicate air system pressure is below minimum operating pressure. An audible alarm is also activated. Upperstructure cab controls will be inoperative if indicator is red.
3. Check Engine Indicator (MIL lamp): Illuminates yellow for any failure that could affect tail pipe emissions.
4. Hydraulic Oil Level Indicator: Illuminates red if oil falls below acceptable operating level.
5. Hydraulic Filter Indicator: Illuminates red to indicate hydraulic reservoir filter needs replaced.
6. Engine Stop Indicator: Illuminates red and pulsing alarm is activated when critical engine fault is detected. Stop engine immediately and repair before continued use.
7. Engine Warning Indicator: Illuminates yellow when non-critical engine fault is detected.
8. Wait-to-Start Indicator: Illuminates yellow until intake manifold warms. Engine can not be started when wait-to-start indicator is illuminated.
9. Diesel Particulate Filter Indicator: Flashes yellow when the need for the particulate filter to regenerate when past engine operation has not provided sufficient conditions for the filter to automatically regenerate.
10. High Exhaust System Temperature Indicator: Illuminates yellow when the exhaust system temperature is or is about to be elevated above normal operating temperatures for the operating mode of the engine.



1. Engine Speed (RPM) Indicator
2. Fuel Level Indicator
3. Diesel Exhaust Fluid (DEF) Level Indicator
4. Transmission Gear Indicator: See *"Driving Undercarriage from Upperstructure Cab"* on page 3-6.
5. Transmission Oil Temperature Indicator
6. Hydraulic Oil Temperature Indicator



OAC2220

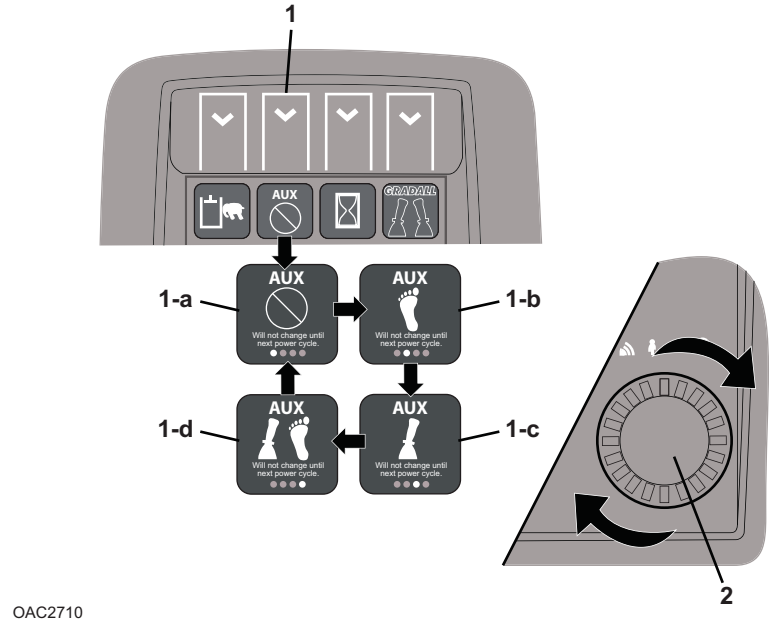
1. Remote Mode/Travel Mode Indicator: Travel mode indicator (image of chassis cab) will illuminate yellow until air pressure reaches 70psi. Upperstructure cab controls will not be active. Remote Mode Indicator (image of upper cab) will appear and illuminate green once required air pressure is met, and upperstructure cab controls will be active.
2. PTO Indicator: Illuminates green to indicate PTO is engaged.

Note: *The PTO indicator applies to serial numbers D1520000001 thru D152000004 only. Indicator is inactive for all other machines.*

3. Check Transmission Indicator: Illuminates yellow to indicate a problem has been detected in the transmission.
4. Fan On/Off Indicator: No illumination indicates fan is in 'Off' position on Right Hand Arm Pod (see page 2-17 for fan control details). With fan in 'On' position, the indicator will illuminate as follows:
   - Fan Indicator illuminates red - Fan is 'On'; A/C is 'off'
   - Fan Indicator illuminates blue - Fan is 'On'; A/C is 'On'
5. Engine Throttle Speed: Press this button to view the engine throttle speed window **(5-a)**. Increase engine speed by rotating the control panel dial **(9)** clockwise. Decrease engine throttle speed by rotating the control panel dial **(9)** counterclockwise. When desired speed is attained, press the Engine Throttle Speed button **(5)**.
6. Auto Idle: Press this button to activate/deactivate auto idle. Indicator will illuminate green when auto idle is active.
   - With auto idle activated, engine speed will return to low idle after 7 seconds of hydraulic control inactivity. Once controls are activated, engine resumes speed set by the operator.
   - With auto idle deactivated, engine speed remains as set by the operator.
7. Air Conditioning On/Off: Press this button to turn air conditioning on/off. Indicator will illuminate blue when air conditioning is on. No illumination indicates air conditioning is off. This button will be inactive when fan switch on Right Hand Arm Pod is in 'off' position.
8. Heater Temperature Control: Press this button to view the heater temperature control window **(8-a)**. Increase heater temperature by rotating the control panel dial **(9)** clockwise. Decrease heater temperature by rotating the control panel dial **(9)** counterclockwise. When desired temperature is attained, press Heater Temperature Control button **(8)**.

Note: *Heater Temperature Control button will be inactive if the fan switch on Right Hand Arm Pod is in 'off' position, or the Air Conditioning is on.*

Auxiliary Hydraulics Control (optional)



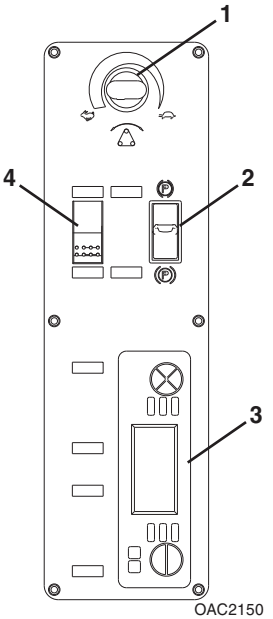
OAC2710

1. Auxiliary Hydraulics Control Selection: Press this button to view available Auxiliary Hydraulic Control options. Scroll the control options by rotating the control panel dial **(2)**. When desired control option is displayed, press the Auxiliary Hydraulics Control button **(1)** to confirm selection. If a new control option is selected, controls will not change until the next power cycle.

   - **1-a** - No Auxiliary Hydraulic Control function is active.
   - **1-b** - Auxiliary Hydraulic Control function is operated by optional foot switch.
   - **1-c** - Auxiliary Hydraulic Control function is operated by the Attachment Shake button on the Left Hand Joystick (see page 2-19 for button location).
   - **1-d** - Auxiliary Hydraulic Control function can be operated by either the Attachment Shake button on the Left Hand Joystick (see page 2-19 for button location), or the optional foot switch.

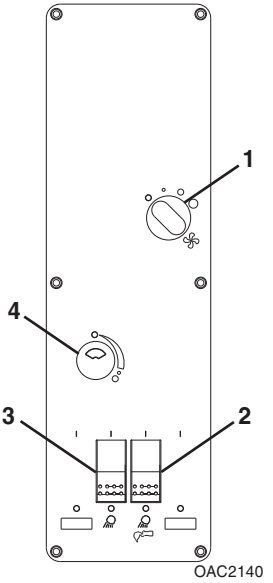
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Left Hand Arm Pod



1. Boom Tilt Speed Switch: Rotary switch. Rotate switch clockwise to decrease boom tilt speed; rotate counterclockwise to increase boom tilt speed.
2. Park Brake Switch: See page 2-26 for details.
3. AM/FM Radio
4. Strobe Light Switch (optional): On/Off switch.

Right Hand Arm Pod



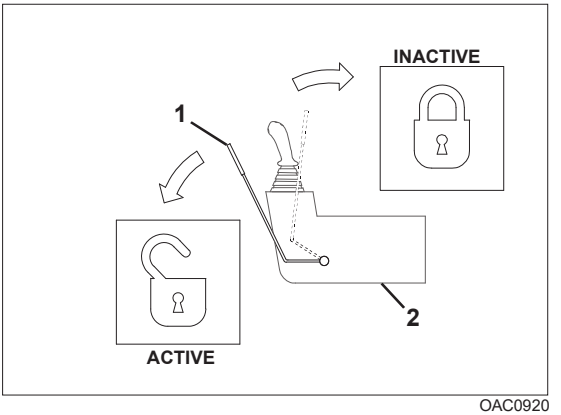
1. Fan Speed: Rotary switch for heater and air conditioner fan.
2. Boom Lights Switch (optional): On/Off switch.
3. Work Lights Switch (optional): On/Off switch.
4. Intermittent Wiper/Washer Switch: See *"Intermittent Wiper/Washer"* on page 2-25.

NOTES:

Joystick Controls

Activating the Joysticks

The joysticks will remain locked/inactive until the control cut out lever **(1)** located on the left hand arm pod **(2)** is moved to the unlocked/active position.

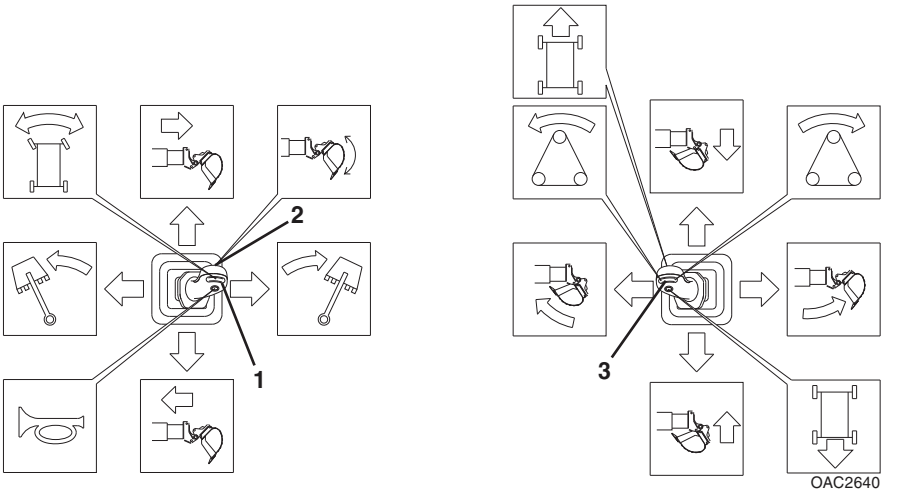


OAC0920

Joystick Control Patterns

Before operating, refer to the selected joystick control pattern located on the LCD display to verify control pattern setting. Ensure the joystick decal matches the machine controls before operating.

SAE Joystick Controls



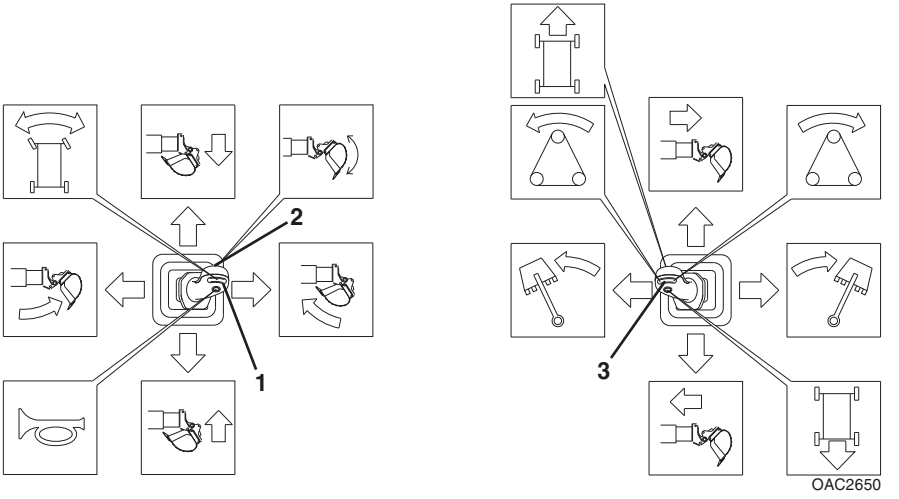
Left Hand Joystick Functions

- Move the joystick back to retract boom; move joystick forward to extend boom. Move joystick right to swing boom right; move joystick left to swing boom left.
- Left-click steer control button **(1)** to turn front wheels left. Right-click steer control button **(1)** to turn front wheels right.
- Attachment shake button **(2)** allows excess dirt or debris to be removed from the boom attachment.
- For two simultaneous boom functions, move the joystick between quadrants. For example, moving the joystick forward and to the left will extend and swing the boom left simultaneously.

Right Hand Joystick Functions

- Move the joystick back to raise boom; move joystick forward to lower boom. Move joystick right to open tool; move joystick left to close tool.
- Left-click boom tilt button **(3)** to tilt boom counterclockwise; right-click boom tilt button **(3)** to tilt boom clockwise.
- For two simultaneous boom functions, move the joystick between quadrants. For example, moving the joystick forward and to the left will lower the boom and close the tool simultaneously.

GRADALL Joystick Controls



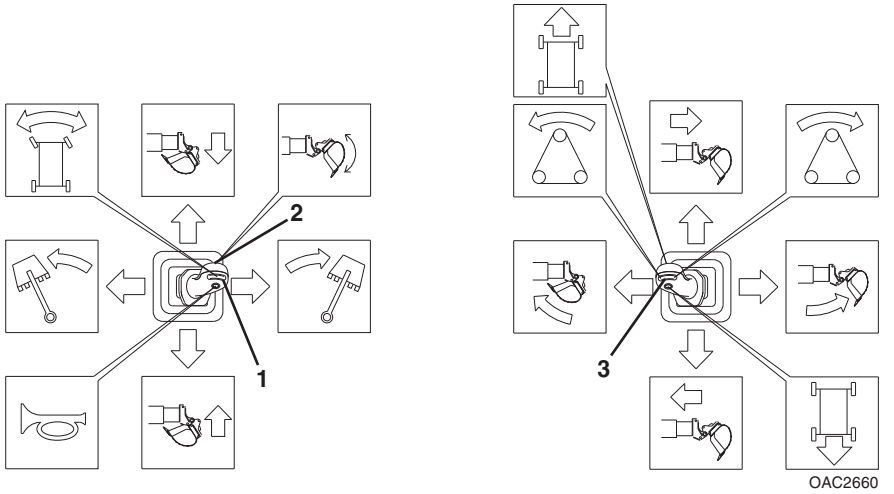
Left Hand Joystick Functions

- Move the joystick back to raise boom; move joystick forward to lower boom. Move joystick right to close tool; move joystick left to open tool.
- Left-click steer control button **(1)** to turn front wheels left. Right-click steer control button **(1)** to turn front wheels right.
- Attachment shake button **(2)** allows excess dirt or debris to be removed from the boom attachment.
- For two simultaneous boom functions, move the joystick between quadrants. For example, moving the joystick forward and to the left will lower boom and open tool simultaneously.

Right Hand Joystick Functions

- Move the joystick back to retract boom; move joystick forward to extend boom. Move joystick right to swing boom right; move joystick left to swing boom left.
- Left-click boom tilt button **(3)** to tilt boom counterclockwise; right-click boom tilt button **(3)** to tilt boom clockwise.
- For two simultaneous boom functions, move the joystick between quadrants. For example, moving the joystick forward and to the left will extend and swing the boom left simultaneously.

JOHN DEERE Joystick Controls



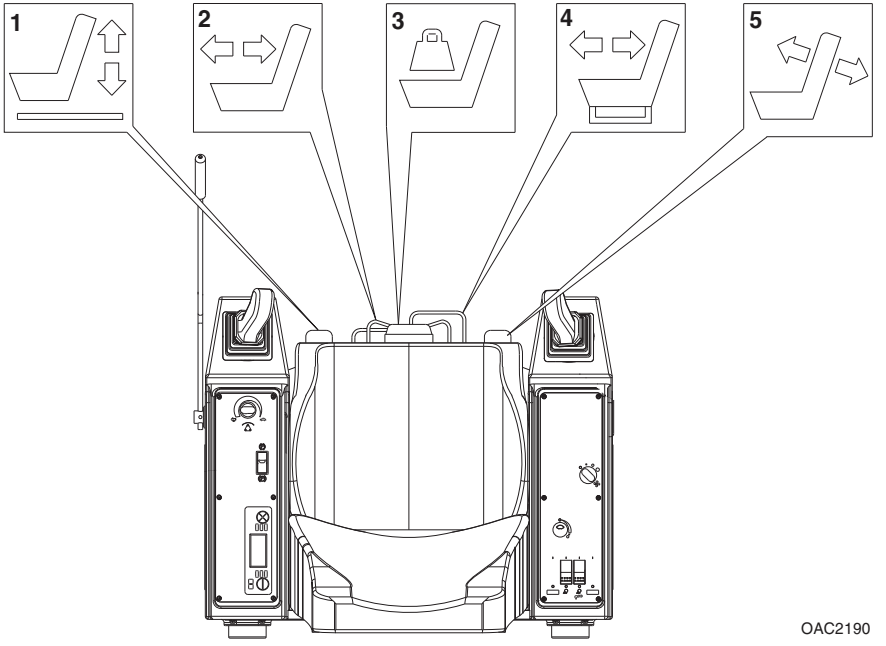
Left Hand Joystick Functions

- Move the joystick back to raise boom; move joystick forward to lower boom. Move joystick right to swing boom right; move joystick left to swing boom left.
- Left-click steer control button **(1)** to turn front wheels left. Right-click steer control button **(1)** to turn front wheels right.
- Attachment shake button **(2)** allows excess dirt or debris to be removed from the boom attachment.
- For two simultaneous boom functions, move the joystick between quadrants. For example, moving the joystick forward and to the left will lower and swing boom left simultaneously.

Right Hand Joystick Functions

- Move the joystick back to retract boom; move joystick forward to extend boom. Move joystick right to open tool; move joystick left to close tool.
- Left-click boom tilt button **(3)** to tilt boom counterclockwise; right-click boom tilt button **(3)** to tilt boom clockwise.
- For two simultaneous boom functions, move the joystick between quadrants. For example, moving the joystick forward and to the left will extend boom and close the tool simultaneously.

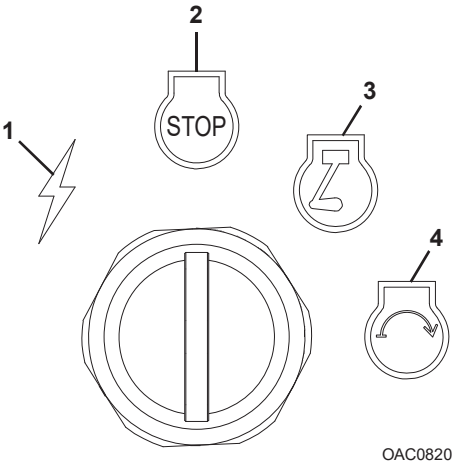
Operator Seat Adjustments



Prior to starting engine adjust seat for position and comfort.

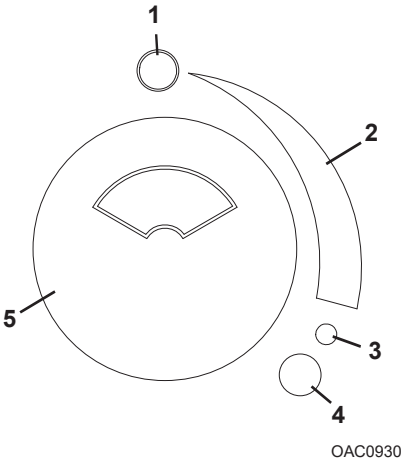
1. Height Adjustment Control
2. Upper Seat Fore and Aft Adjustment Control
3. Weight Control Adjustment
4. Lower Seat Fore and Aft Adjustment Control
5. Seat Back Adjustment

Ignition



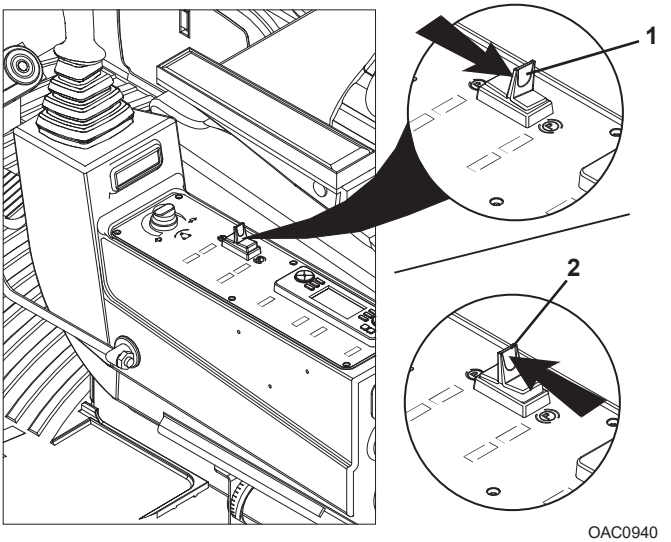
1. ACC: Voltage is available for all electrical functions.
2. OFF: Engine off.
3. RUN: Prohibits rotating key switch to position 4 in the event the engine does not start. Rotate the key to position 2 then back to position 4 to re-engage the starter.
4. START: Engine start.

Intermittent Wiper/Washer



1. OFF
2. DELAY: Rotating knob clockwise decreases delay.
3. LOW: Low wiper speed. No delay.
4. HIGH: High wiper speed. No delay.
5. WASHER: Press and hold switch to activate washer.

Park Brake Switch



OAC0940

- Park Brake Switch: This switch controls the application and release of the park brake. Indicator light on the LCD display illuminates red to indicate brake is applied.



View of indicator when park brake is on. Will illuminate red.



View of indicator when park brake is off.

OAC2200

- With the engine running and the park brake switch in “OFF” position **(1)**, park brake is disengaged. With switch in “ON” position **(2)**, park brake is engaged and transmission will not engage forward or reverse.

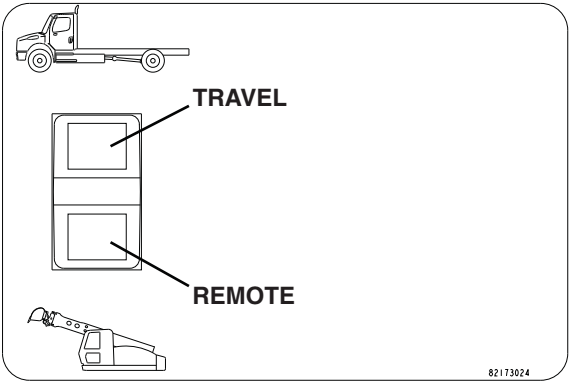
SECTION 3 - OPERATION

3.1 REMOTE CONTROL PREPARATION

Preparing Undercarriage for Remote Control Operation

Remote travel is to be used for positioning unit at job site, not for over-the-road driving. After reaching job site, perform the following steps to prepare undercarriage for remote control operation:

1. Park the machine in a safe, level area.
2. Turn undercarriage ignition switch to “OFF” position.
3. Set the undercarriage park brake.
4. Set Travel/Remote selector switch, located on undercarriage cab dash, to remote



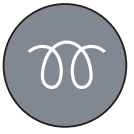
OAC2290

5. Proceed to upperstructure cab.

Preparing Upperstructure for Remote Control Operation

All instructions on undercarriage cab remote control decal must be followed before starting machine in remote operation.

1. Place control cut out lever in locked/inactive position (refer to page 2-19).
2. Turn ignition switch to “RUN” position.



OAC2260

3. The wait-to-start light will illuminate on LCD Display. When light turns off, move to step 4.

Note: *Engine will not start when light is illuminated.*

4. Turn ignition switch to “START” position to start engine. If engine fails to start, turn ignition switch to “OFF” position and return to step 2.
5. Position control cut out lever in the unlocked/active position to activate and engage joystick controls and pedals in remote operation.

3.2 CHECKS BEFORE REMOTE CONTROL OPERATION

This section outlines the checks to be performed at the beginning of each work shift or at each change of operator. Repair any deficiencies before driving or operating the equipment. During warm-up period, check the following:

- Make sure the engine does not start with the control cut out lever in the lowered position.
- Check to ensure the engine functions properly and the lights and indicators located in the upperstructure cab are functioning.
- Check to ensure control pattern decal matches joystick control pattern shown on the LCD display.
- Ensure digging brakes and park brake function properly before traveling a significant distance in remote control.
- Be sure travel alarm and horn function properly. Both must be audible from the cab with engine running.
- Make sure all boom and attachment functions operate smoothly and correctly.
- Forward/reverse travel and steering operate correctly.
- Swing the upperstructure left and right and ensure the swing brake functions properly.

Normal Engine Operation

- Observe gauges frequently to be sure all engine systems are functioning properly.
- **Be alert for unusual noises or vibration.** When an unusual condition is noticed, park machine in a safe position and perform shut-down procedure. See *"Remote Mode Engine Shutdown"* on page 3-21. Report condition to your supervisor or maintenance personnel.
- **Avoid prolonged idling.** If the engine is not being used, turn it off.

3.3 REMOTE MODE BRAKE SYSTEM

Remote Control Braking



OW0021

REMOTE CONTROL BRAKING. Allow sufficient time for full brake system pressure to develop before operating unit in remote control. Low air light indicator will turn off when pressure reaches 70 psi.

Always apply upperstructure parking brake before leaving upperstructure cab.

Digging Brake

When traveling in remote mode, the digging brake is automatically applied upon release of the forward/reverse travel joystick button. See page 3-6 for more detail.

- When activated, the digging brake is applied to all wheels to hold the undercarriage stationary while the excavator is digging.

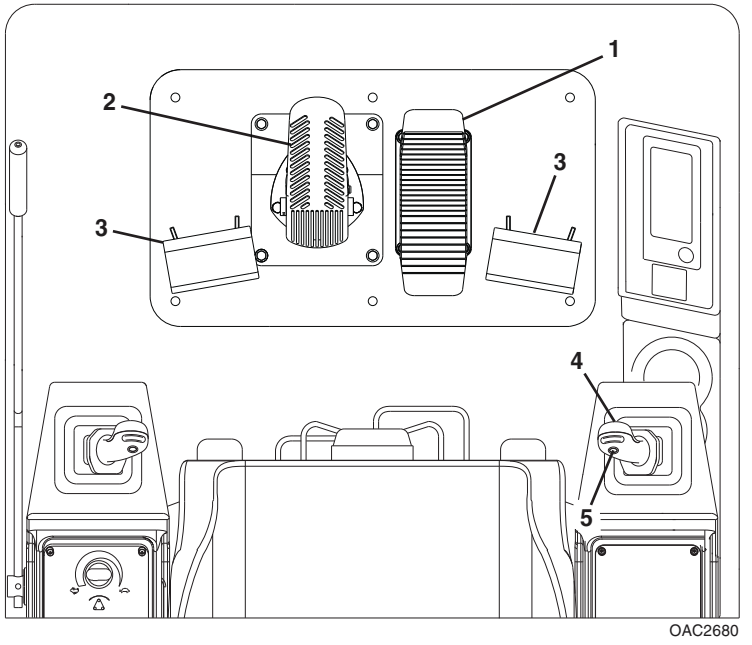
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3.4 REMOTE MODE POWER TRAIN

Driving Undercarriage from Upperstructure Cab

Note: *Never tow a load using remote control drive.*

Operate the engine at full throttle. Undercarriage speed is controlled by the amount of travel pedal actuation.



1. Travel Pedal: The travel pedal controls undercarriage travel speed.
2. Brake Pedal:
   - Prior to Travel - Depress fully to engage transmission and allow forward/ reverse travel.
   - While Traveling - Depress to slow or stop machine.
3. Foot Rests
4. Joystick Button - Forward Travel
5. Joystick Button - Reverse Travel

With boom positioned over front of machine:

- **Forward Travel** - Press and hold the forward travel joystick button **(4)**. Fully depress brake pedal **(2)**. Transmission Gear Indicator on LCD display will display a “1” on the left hand side of icon, indicating request for 1st gear engagement has been made:



Transmission Gear Indicator will then display a “1” on the right hand side of icon, indicating transmission is in gear and ready for forward travel:



With forward travel joystick button still depressed, release brake pedal to begin travel. Use the travel pedal **(1)** to increase/decrease travel speed. **Forward travel joystick button must remain depressed for travel. Releasing the button during travel will engage digging brake.**

UNEXPECTED TRAVEL. If on level surface, machine will travel when transmission is engaged and brake pedal released without any actuation of travel pedal.



OW0021

- **Braking** - Allow travel pedal **(1)** to return to neutral position. Fully depress brake pedal **(2)** until machine comes to a stop. Release forward travel joystick button **(4)**. Digging brake will set.

With boom positioned over front of machine:

- **Reverse Travel** - Press and hold the reverse travel joystick button **(5)**. Fully depress brake pedal **(2)**. Transmission Gear Indicator on LCD display will display an “R” on the left hand side of icon, indicating request for reverse gear engagement has been made:



Transmission Gear Indicator will then display an “R” on the right hand side of icon, indicating transmission is in gear and ready for reverse travel:



With reverse travel joystick button still depressed, release brake pedal to begin travel. Use the travel pedal **(1)** to increase/decrease travel speed. **Reverse travel joystick button must remain depressed for travel. Releasing the button during travel will engage digging brake.**

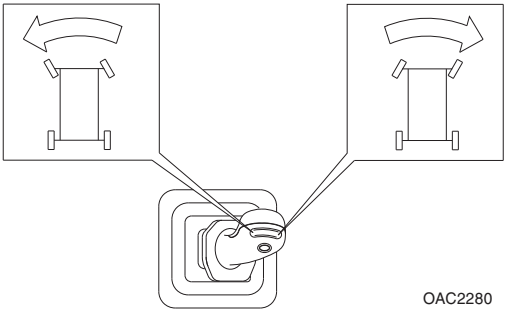
WARNING

OW0021

UNEXPECTED TRAVEL. If on level surface, machine will travel when transmission is engaged and brake pedal released without any actuation of travel pedal.

- **Braking** - Allow travel pedal **(1)** to return to neutral position. Fully depress brake pedal **(2)** until machine comes to a stop. Release reverse travel joystick button **(4)**. Digging brake will set.

Steering the Undercarriage from Upperstructure Cab



On Left Hand Joystick, left-click steer control button to turn front wheels left. Right-click steer control button to turn front wheels right.

UNEXPECTED DIRECTION OF TRAVEL. Before remote travel, check to be sure you are aware of orientation of upperstructure with regard to undercarriage. Confusion could cause travel in the opposite direction you are expecting.

WARNING

OW0021

3.5 TYPICAL DIG CYCLE

Standard SAE Boom and Attachment Functions

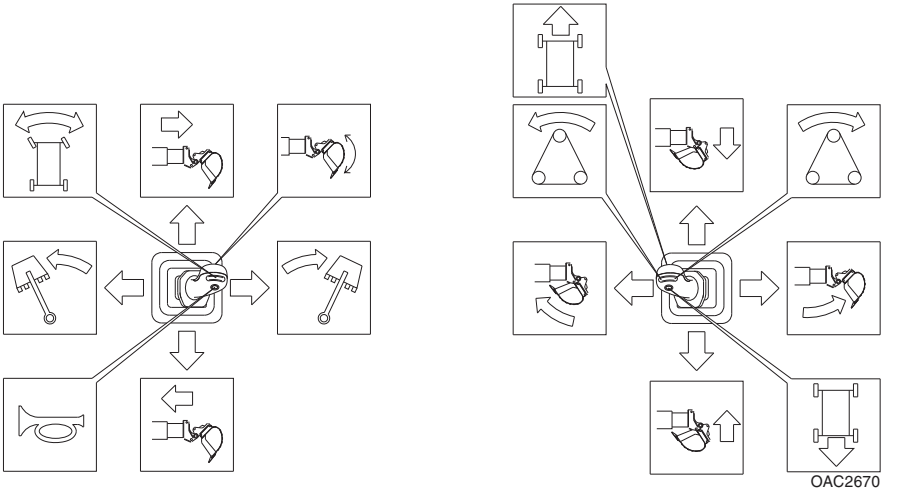
Prepare for boom and attachment function:

1. Position unit for efficient attachment usage. **Notice!:** While digging, pay close attention to boom position in relation to undercarriage components. In certain instances it is possible for the boom to come into contact with the undercarriage.
2. Stop engine and secure door and windows in desired position for ventilation. Remove boom tie down chain from boom.
3. Perform checks before remote control operation located on page 3-3. Set engine to full throttle position.
4. Be certain control cut out lever is in down position to energize joysticks and foot pedals.

UNEXPECTED MOVEMENT. Test your controls before operating. If controls have been changed to another pattern, be sure you are familiar with the functions and ensure that the diagram in the cab shows the actual pattern in use. Alternate patterns are located in the operator cab in the manual compartment. If you do not have the proper control decal, do not change the control pattern.



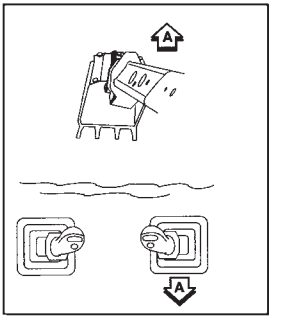
OW0021



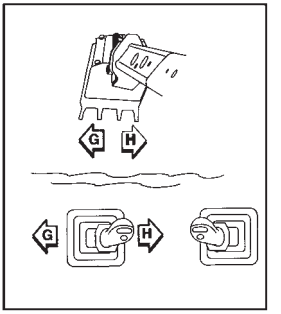
Standard SAE control pattern shown in illustration above.

Note: *Practice with controls in a safe, open area. Joysticks and pedals return to neutral position when released.*

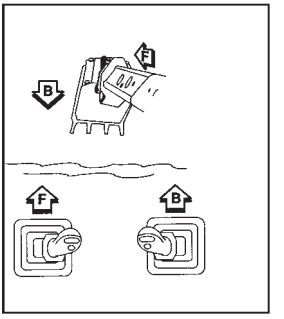
1. Pull back on right joystick **(A)** to raise boom far enough to clear all obstructions.



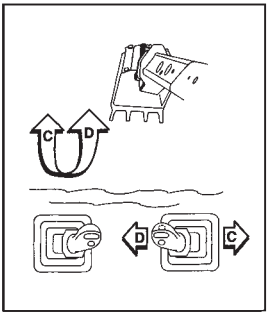
2. Move left joystick to left **(G)** to swing left or to right **(H)** to swing right.



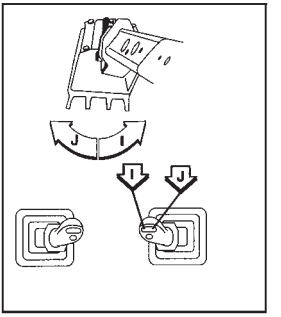
3. While pushing left joystick forward **(F)** to extend boom, push right joystick forward **(B)** to lower boom into position for start of cut.



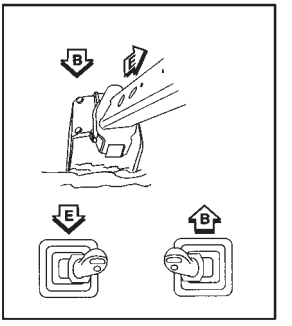
4. Move right joystick to right **(C)** to open bucket or to left **(D)** to close bucket for correct penetration. Teeth should angle downward slightly (about 5 degrees). Angle may be greater for soft digging.



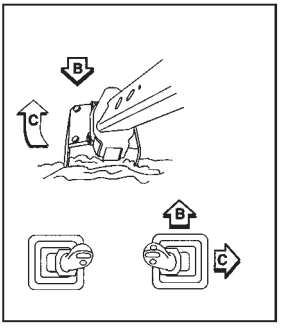
5. If required, press left side of tilt switch **(I)** to tilt counterclockwise or right side of switch **(J)** to tilt clockwise.



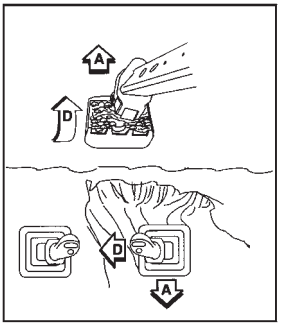
6. While pushing forward on right joystick **(B)** to lower boom and force bucket into ground, pull back on left joystick **(E)** to retract boom and fill bucket.



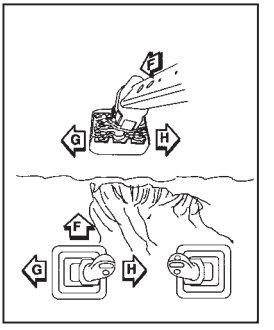
7. As bucket is filling, jog right joystick forward **(B)** to lower boom and maintain depth of cut. At same time jog right joystick to right **(C)** to open bucket and maintain proper bucket angle.



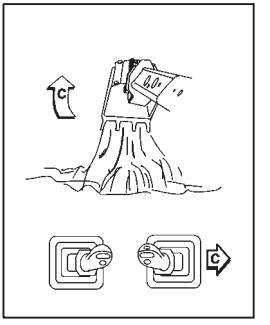
8. When bucket is full, or when boom is fully retracted, move right joystick to left **(D)** to close bucket. At same time pull right joystick back **(A)** to raise boom far enough to clear obstructions.



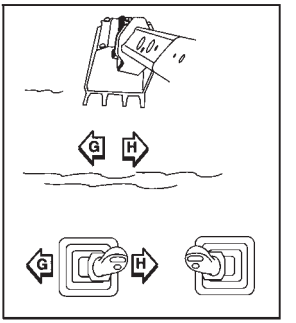
9. Move left joystick to right **(H)** to swing right or to left **(G)** to swing left to dump site. If necessary, extend boom by pushing left joystick forward **(F)**.



10. Move right joystick to right **(C)** to open bucket and dump load.



11. Move left joystick to left **(G)** or right **(H)** to align boom for next cut. Repeat steps 3 through 11.



3.6 LIFTING & PLACING A LOAD

LIFTING & POSITIONING LOADS. Failure to plan a lift properly could result in death or serious injury.

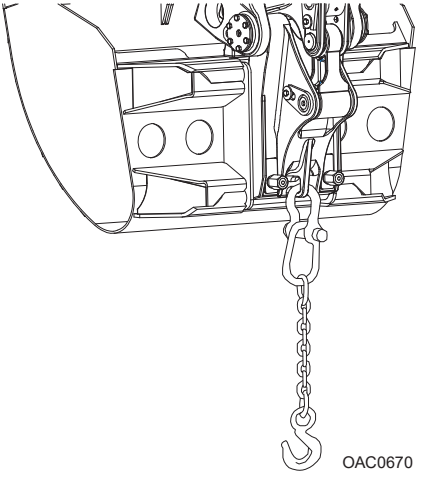
WARNING

OW0021

The automatic boom tilt brake will not prevent boom from tilting in response to an external load. Load must be centered under bucket adapter with boom level from side to side.

Precautions

- Use the lift capacity chart to calculate maximum load. Keep in mind, the attachment weight and rigging must be added to the load, then compared to the value on the lift capacity chart.
- If it becomes necessary to shut the engine off while positioning a load, place load on the ground prior to shutting off engine.
- Be thoroughly familiar with excavator hand signals shown at the end of the manual.
- Operate machine at full throttle and do not shut off engine with suspended load.
- Do not travel with suspended load positioned over the side of the machine.



OAC0670

- Suspend loads only as shown above. Passing load line over open bucket can cause uncontrolled movement of load.
- To lift loads, level boom from side to side and close adapter fully against stops. Pass through adapter as shown and be certain chain is locked on itself.

General

There is a lift capacity difference between the excavator's best and worst lift positions. Just because it can lift a load from one point does not mean it can safely deliver the load to any other point.

Prior to lifting and placing a load, map out the lift, swing, and lower path to ensure that capacity, both hydraulic and stability tipping limits, are not exceeded. The best lifting position is over the rear with the excavator level and the boom fully retracted.

You must plan the lift based on the worst condition of the lift and delivery, not the best. The worst condition can only be determined by performing an UNLOADED TEST AND DELIVERY of the load.

Loads shown on chart in cab are hydraulic lift capacities with those in shaded area indicating tipping limits. Exceeding these capacities can cause a relief valve to open allowing the load to fall or in some cases, the machine to tip over.

Positioning Machine For A Lift

The machine must be on a firm, level surface when making a lift.

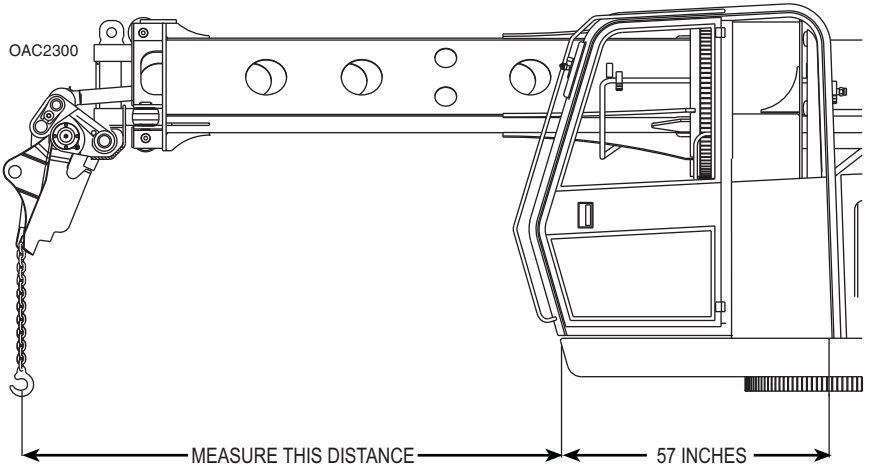
The shorter the load radius, the greater the lift capacity. Position the unit to minimize boom extension and swing while keeping adequate distance from obstructions and excavations.

Position machine to gain maximum visibility of load and delivery point. If conditions do not permit a clear view, use a signal person.

Planning A Lift

Note: *Lift capacities are based on machine being on a firm, level surface and also no load being suspended beneath bucket adapter.*

1. Determine the weight of the load including weight of slings, chains, bucket/ attachment (tool), and auxiliary lifting devices. Refer to lift capacity chart for weight adjustment required for bucket.
2. Move the machine to the best position for making the lift.
3. Perform an unloaded trial run of lift to determine maximum boom height/depth and load radius required to complete the lift.
4. Measure boom height/depth from hole in adapter to ground level (same level as bottom of tire). Be sure to allow for length of chain and height of load.



5. Measure load radius from inner corner of frame at front of cab to vertical load line (as shown above) and add distance to center of rotation (57 inches).
6. Refer to lift capacity chart column for required load radius. If required radius is between columns, use column for next larger radius.
7. Check the appropriate capacities for required boom height/depth. The smaller of these capacities is the maximum load permitted for lift conditions.

Note: *To determine working load limits the operator must also consider wind, hazardous conditions, experience of personnel and proper load handling.*

3.7 LIFT CAPACITY

LOAD POINT HEIGHT		LOAD RADIUS										
		10' (3.0m)		15' (4.6m)		20' (6.1m)		25' (7.6m)		MAXIMUM RADIUS		
		OVER END	OVER SIDE	OVER END	OVER SIDE	OVER END	OVER SIDE	OVER END	OVER SIDE		OVER END	OVER SIDE
ABOVE GROUND LEVEL	20' (6.1m)							5715 (2590)	5715 (2590)	27' 4" (8.3m)	5070 (2300)	5070 (2300)
	15' (4.6m)			12425 (5635)	12425 (5635)	8795 (3990)	8795 (3990)	6515 (2955)	6515 (2955)	29' 5" (9m)	5120 (2320)	5120 (2320)
	10' (3.0m)					9880 (4480)	9880 (4480)	7140 (3240)	7140 (3240)	30' 6" (9.3m)	5230 (2370)	5230 (2370)
	BOOM LEVEL 8' 7" (2.4m)					10080 (4570)	10080 (4570)	7255 (3290)	7255 (3290)	30' 7" (9.3m)	5265 (2390)	5265 (2390)
	5' (1.5m)					10290 (4665)	10030 (4550)	7415 (3365)	7175 (3255)	30' 7" (9.3m)	5375 (2440)	5195 (2355)
AT GROUND LEVEL						9815 (4450)	9800 (4445)	7265 (3295)	7035 (3190)	29' 11" (9.1m)	5550 (2515)	5310 (2410)
BELOW GROUND LEVEL	5' (1.5m)			11090 (5030)	11090 (5030)	8705 (3950)	8705 (3950)	6745 (3060)	6745 (3060)	28' 3" (8.6m)	5740 (2605)	5725 (2595)
	10' (3.0m)	8500 (3855)	8500 (3855)	8630 (3915)	8630 (3915)	7365 (3340)	7365 (3340)	6010 (2725)	6010 (2725)	25' 5" (7.7m)	5910 (2680)	5910 (2680)
	15' (4.6m)	5840 (2650)	5840 (2650)	6640 (3010)	6640 (3010)	6075 (2755)	6075 (2755)			20' 11" (6.4m)	5930 (2690)	5930 (2690)
	20' (6.1m)									12' 10" (3.9m)	4875 (2210)	4875 (2210)

The above loads are in compliance with the SAE standard J1097 DEC2005. They do not exceed 87% of hydraulic lifting capacity or 75% of tipping capacity.

Loads shown in shaded areas indicate the load is limited by tipping rather than hydraulic lift capacity.

The rated lift capacity is based on the machine being equipped with 15,500 lb (7030 kg) counterweight, standard boom, standard tires, no auxiliary hydraulics, and no bucket.

Adjust the listed rated capacities by subtracting the value listed for bucket/attachment used:

8065-6007 60" (1.5 m) Ditching - 807 lbs. (366 kg)
8065-6006 66" (1.7 m) Ditching - 892 lbs. (405 kg)
8065-6002 72" (1.8 m) Ditching - 944 lbs. (428 kg)
8045-6020 24" (610 mm) Excavating - 603 lbs. (274 kg)
8045-6021 30" (762 mm) Excavating - 660 lbs. (300 kg)
8045-6022 36" (914 mm) Excavating - 741 lbs. (336 kg)
8045-6023 42" (1.1 m) Excavating - 841 lbs. (382 kg)
8045-6024 48" (1.2 m) Excavating - 957 lbs. (434 kg)
8065-6013 72" (1.8 m) Dredging - 1114 lbs. (505 kg)
8065-6102 40" (1.0 m) Pavement - 1262 lbs. (573 kg)
8065-6024 8' (2.4 m) Blade - 630 lbs. (285 kg)
8065-6009 Single Tooth Ripper - 557 lbs. (253 kg)

- **Note: Bucket adjustment values are 87% of the actual bucket weights.**

The load point is located on the bucket pivot point, including loads listed for maximum radius.

Do not attempt to lift or hold any load greater than these rated values at specified load radii and heights. The weight of slings and any auxiliary devices must be deducted from the rated load to determine the net load that may be lifted.

ATTENTION: All rated loads are based on the machine being stationary and level on a firm supporting surface. The user must make allowance for particular job conditions such as soft or uneven ground, out of level conditions, side loads, hazardous conditions, experience of personnel, etc. The operator and other personnel must read and understand the operator manual before operating this machine. Rules for safe operation of equipment must be adhered to at all times.

OAC0690

Note: *This is a sample capacity chart* ***only! DO NOT*** *use this chart, use the one located in your operator cab.*

The rated lift capacity is based on the machine being on flat, level ground and equipped with standard boom and no bucket. Adjust the listed rated capacities on capacity chart located in operator cab according to each bucket as shown:

Part Number	Size	Description	Weight Adjustment
82106011	60"	(1.5m) Ditching	-651lbs. (295kg)
82106029	36"	(914mm) Excavating	-698lbs. (317kg)

Note: *Bucket adjustment values are 87% of the actual bucket weights. Any weight adjustment for Gradall buckets not shown can be calculated by multiplying actual bucket weight by .87.*

- The load point is located on the bucket pivot point, including load listed for maximum radius.
- Do not attempt to lift or hold any load greater than the rated values at specified load radii and heights. The weight of slings and any auxiliary devices must be deducted from the rated load to determine the net load that may be lifted.

ATTENTION: All rated loads are based on the machine being stationary and level on a firm supporting surface. The user must make allowance for particular job conditions such as soft or uneven ground, out of level conditions, side loads, hazardous conditions, experience of personnel, etc. The operator and other personnel must be fully trained and understand this Operator Manual and Safety Manuals furnished by the manufacturer before operating this machine. Rules for safe operation of equipment must be adhered to at all times.

3.8 REMOTE MODE ENGINE SHUTDOWN

To shutdown the excavator, park in a safe location on flat level ground and away from other equipment and/or traffic lanes.

From Upperstructure Cab:

1. Stop machine by releasing travel pedal to neutral position to engage digging brake.
2. Swing the machine to align upperstructure with undercarriage
3. Lower attachment/boom to ground or stow boom in boom rest. See *"Boom Stow Procedure"* on page 3-23.
4. Operate engine at low idle for 3 to 5 minutes. **DO NOT** rev engine.
5. Turn key to "OFF" position and remove key.
6. Exit excavator maintaining 3-point contact.
7. Chock wheels (if necessary).

MACHINE ROLL-AWAY HAZARD. Lower boom to ground or boom rest and stop engine before leaving cab.

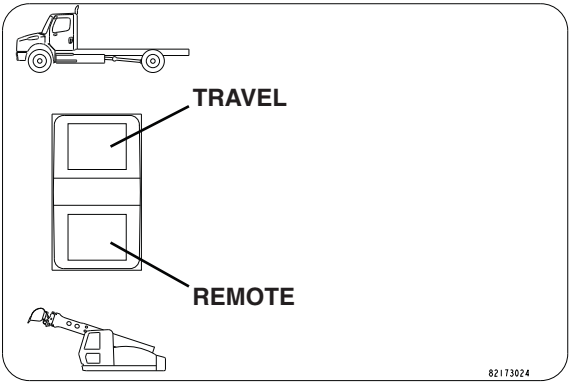


OW0021

3.9 RETURN TO TRAVEL MODE

Preparing Upperstructure for Undercarriage Operation

1. Position unit on level surface and release travel pedal to neutral position to engage digging brake.
2. Position boom in rest, allowing clearance for attachment. See *"Boom Stow Procedure"* on page 3-23.
3. Apply parking brake.
4. Shut down engine from upperstructure cab.
5. Proceed to undercarriage cab.
6. Set parking brake in undercarriage cab.
7. Set Travel/Remote selector switch, located on chassis cab dash, to travel.

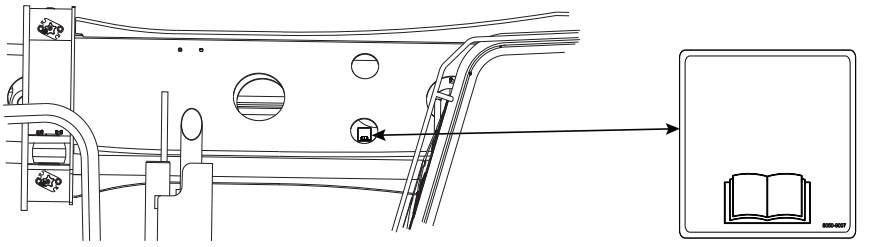


OAC2290

8. Start engine.

Boom Stow Procedure

1. With teleboom extended, stow boom in boom rest.
2. Retract telescope boom until the boom position decal is visible in the bottom smaller hole in the main boom, as illustrated:



OAC2690

Securing Unit for Driving

Drive to and from job site only under the following conditions:

- Boom is in boom rest.
- Mirrors are clean and properly adjusted for visibility.
- Doors and upperstructure windows secured in closed position.
- No load attached to any part of machine.
- Tires inflated to proper pressure.
- Seat belt buckled across lap.
- Drive in accordance with Federal, State, and Local requirements.
- Plan your route.

3.10 PARKING THE EXCAVATOR

Precaution

If the machine is in remote and must be shut down for an extended period of time, return the machine to conventional undercarriage operation.

Avoid parking on roads or highways. If it cannot be avoided, or in case of emergency, display warning flags, flares or flashing lights.

Parking Procedure

1. Turn off engine.
2. Fill fuel tank to minimize condensation.
3. Lock all doors and covers and install protective window covers if available.

Note: *If disconnection/removal of battery is desired, consult the chassis manufacturer manual for instructions or precautions prior to doing so.*

3.11 PRESERVATION & STORAGE

- Park the machine following the procedure on page 3-24.
- Tape a note inside cab window indicating the person to be called in an emergency.
- If machine is on an unpaved surface, be sure tires are resting on sturdy boards to prevent them from being frozen in soft ground.
- Periodically cycle hydraulic functions until normal operating temperature is reached, then apply Boeshield *T9 (part number 1440-4645) to exposed cylinder rods.

Note: *If disconnection/removal of battery is desired, consult the chassis manufacturer manual for instructions or precautions prior to doing so.*

Maintenance

- Take a sample of hydraulic fluid for analysis. ***Note****: Not all analysis methods are compatible with all hydraulic fluids (e.g., laser particle counters do not record accurate cleanliness levels in Mobil 424 due to some of the oil additives being interpreted as contaminants). Consult with your analysis lab as to oil type and test method.*
- Thoroughly clean all mud and debris from the machine to help protect surfaces from corrosion.
- Lubricate all grease fittings until fresh lube is expelled from the lube point.
- If you are close to any lubricant change period, make the change before storage.
- Check level of anti-freeze, drain and refill if necessary to obtain proper protection.

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SECTION 4 - ATTACHMENTS

4.1 APPROVED ATTACHMENTS

To determine if an attachment is approved for use on the hydraulic excavator you are using, perform the following prior to installation.

- Use only Gradall approved attachments.
- Before selecting specific attachments for specific models, consult the load chart on the model literature and consult either an authorized Gradall distributor or Gradall.

If any of the above conditions are not met, do not use the attachment.

4.2 UNAPPROVED ATTACHMENTS



OW0021

Use only approved attachments. Attachments which have not been approved for use with your excavator could cause machine damage or an accident resulting in death or serious injury.

Do not use unapproved attachments for the following reasons:

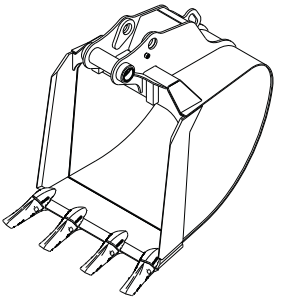
- Gradall cannot establish range and capacity limitations for “will fit,” homemade, altered, or other non-approved attachments.
- An overextended or overloaded excavator can tip over with little or no warning and cause death or serious injury to the operator and/or those working nearby.
- Gradall cannot assure the ability of a non-approved attachment to perform its intended function safely.

4.3 ATTACHMENT OPERATION

- Capacities and range limits for the excavator change depending on the attachment being used.
- Separate attachment instructions (if applicable) must be kept in Manual Holder in cab with this Operator & Safety Manual. An additional copy must be kept with the attachment if it is equipped with a manual holder.
- Window guards must be in place when using powered attachments such as hammers, augers or mowers capable of producing flying debris.

Excavating Buckets

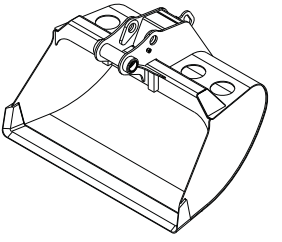
Size
36" (914mm)



OAC0230

Ditching Buckets

Size
60" (1.52m)



OAC2240

SECTION 5 - LUBRICATION & MAINTENANCE

5.1 INTRODUCTION

Service the product in accordance with the maintenance schedule on the following pages. Complete all required maintenance before operating unit.

Service intervals are based on machine usage of 1500 hours annually. Use of your product may vary significantly and you must adjust service frequency for your usage to obtain maximum service life.

Always check hourmeter and date at beginning of shift to be certain services are performed at proper intervals. Perform service at whichever interval comes first.

Note: *Failure To Use Gradall Hydraulic Filter Elements Could Void Warranty.*



OW0021

FALL HAZARD. Use extreme caution when checking items beyond your normal reach. Use an approved ladder. Failure to comply could result in death or serious injury.

If guards are removed for service, replace them before operating machine.

Do not step or stand on engine cover or upperstructure heater cover when performing checks and services in the area of the main boom and cradle.

Before removing filler caps or fill plugs, wipe all dirt and grease away from the ports. If dirt is allowed to enter ports, it can shorten the life of major hydraulic components along with o-rings, seals, packing and bearings.



OW0031

ELECTRICAL COMPONENT DAMAGE. Do not pressure wash or steam clean under the valve cover on the upperstructure.

When adding fluids, refer to *"Product Specifications"* on page 7-1 to determine proper fluid type.

Clothing and Safety Gear

Wear all the protective clothing and personal safety devices issued to you or called for by job conditions. **DO NOT** wear loose clothing or jewelry that can get caught on controls or moving parts. Refer to page 1-13 for more detail.

5.2 GENERAL MAINTENANCE INSTRUCTIONS

Prior to performing any service or maintenance on the excavator, follow the shutdown procedure on page 3-21 unless otherwise instructed and place "Do Not Operate" tag on steering wheel in associated cab.



OW0021

CUT/CRUSH/BURN HAZARD. Do not perform service or maintenance on the machine with the engine running. Failure to comply could cause death or serious injury.

- Ensure excavator is level for proper fluid readings.
- For boom service, extend boom, close bucket and lower onto flat ground.
- Clean lubrication fittings before lubricating.
- After greasing excavator, cycle all functions several times to distribute lubricants.
- Apply a light coating of engine oil to all linkage pivot points.
- Drain engine and gear cases after operating when oil is hot.
- Check all lubricant and coolant levels when cool.



OW0021

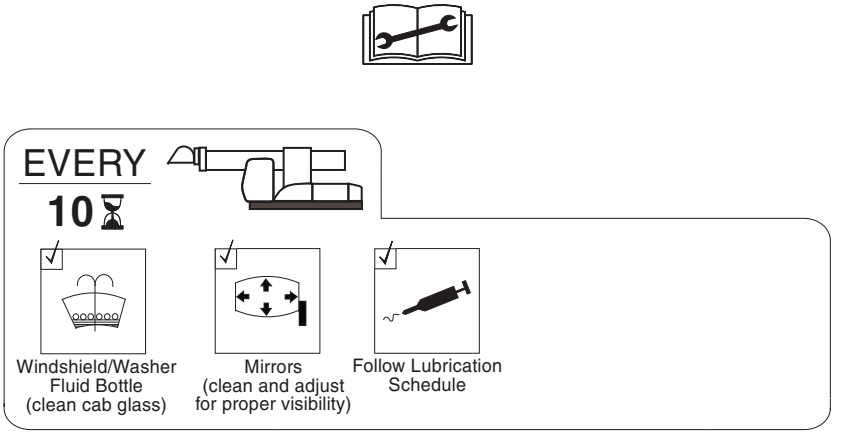
MACHINE DAMAGE. Contact Gradall before welding on machine. Welding could damage wires, electronic processors, hoses, and tubes. Prior to welding, turn off ignition, unplug all electronic processors and disconnect positive (+) and
negative (-) battery cables from battery posts only. Do not disconnect cable leads from studs on battery box panel. Connect positive (+) and negative (-) cables together. Remove or adequately shield all components, hoses, tubes, and wires in the area. Component damage could cause an accident resulting in death or serious injury.

Tire Service

Tire service must be performed by a qualified tire service center or an authorized person that is properly trained in procedures and use of safety equipment designed for tire service.

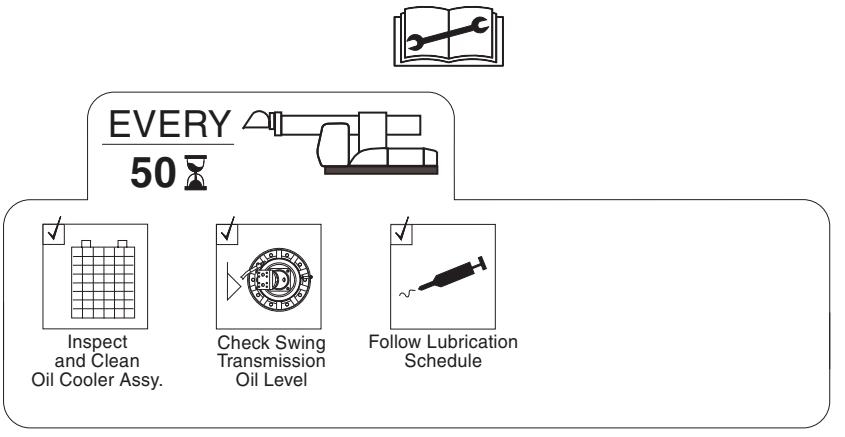
5.3 SERVICE & MAINTENANCE SCHEDULES

10 Hour Maintenance Schedule



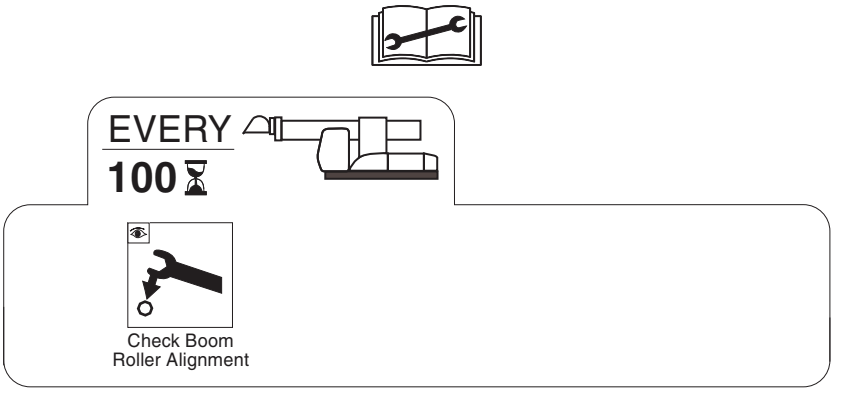
OAC2350

50 Hour Maintenance Schedule



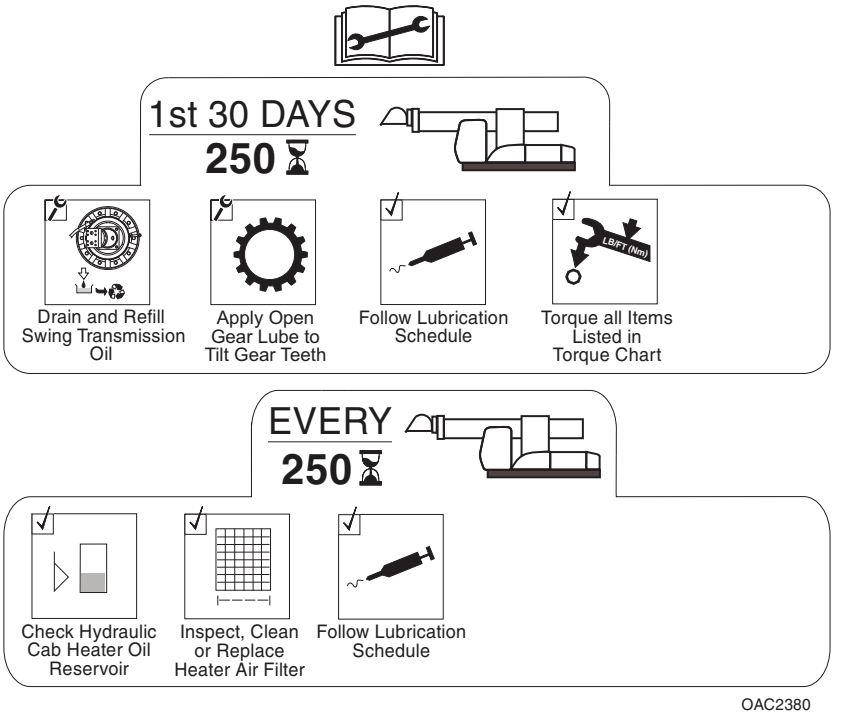
OAC2360

100 Hour Maintenance Schedule



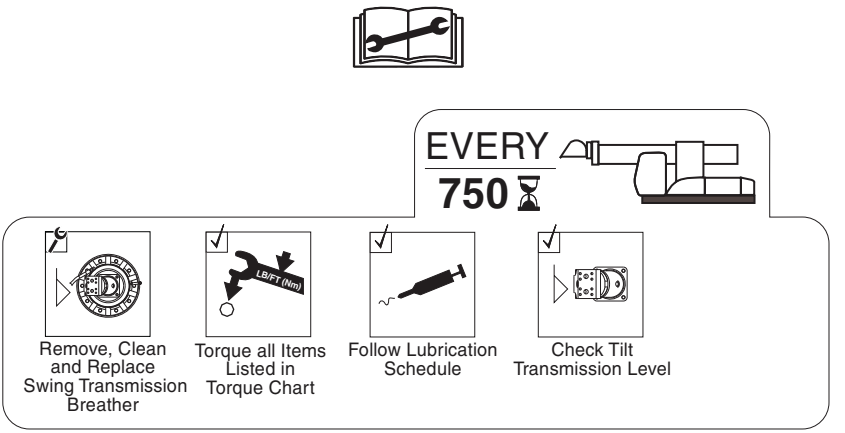
OAC2370

1st 30 Days (250 hrs Max) & 250 Hour Maintenance Schedule - (Upperstructure)



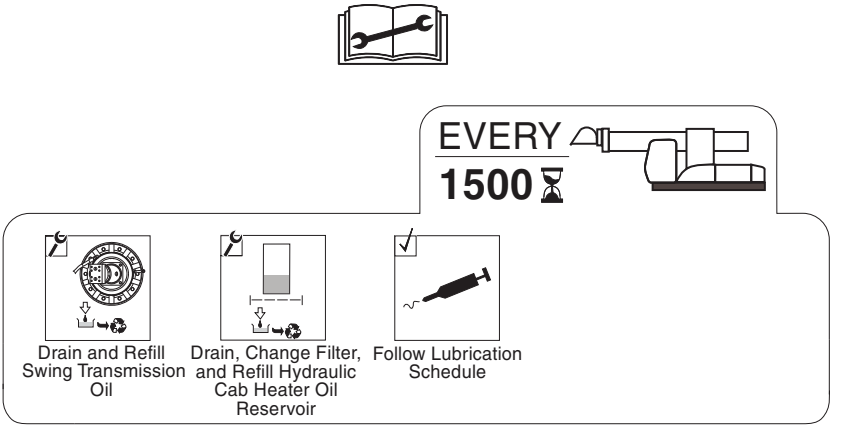
OAC2380

750 Hour Maintenance Schedule



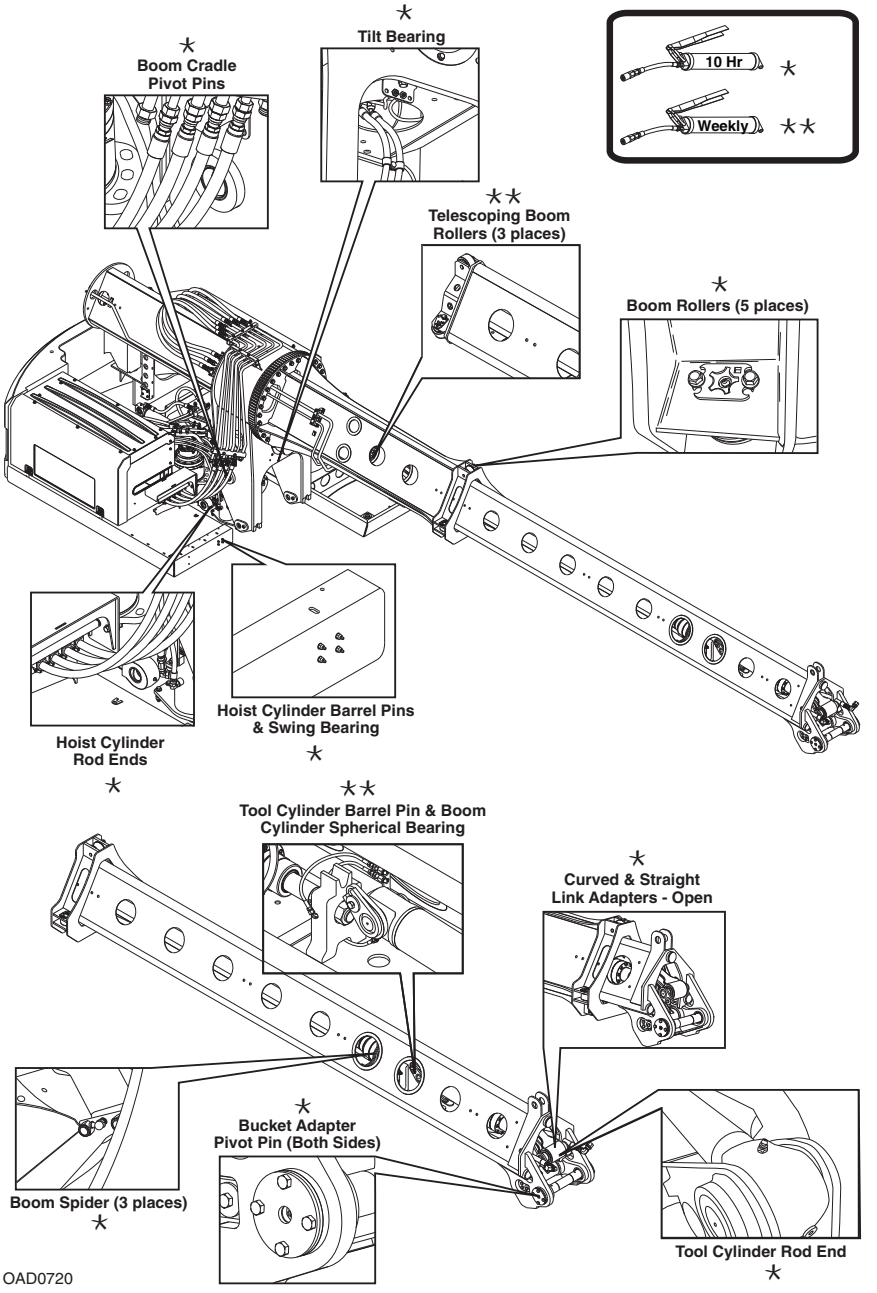
OAC2390

1500 Hour Maintenance Schedule

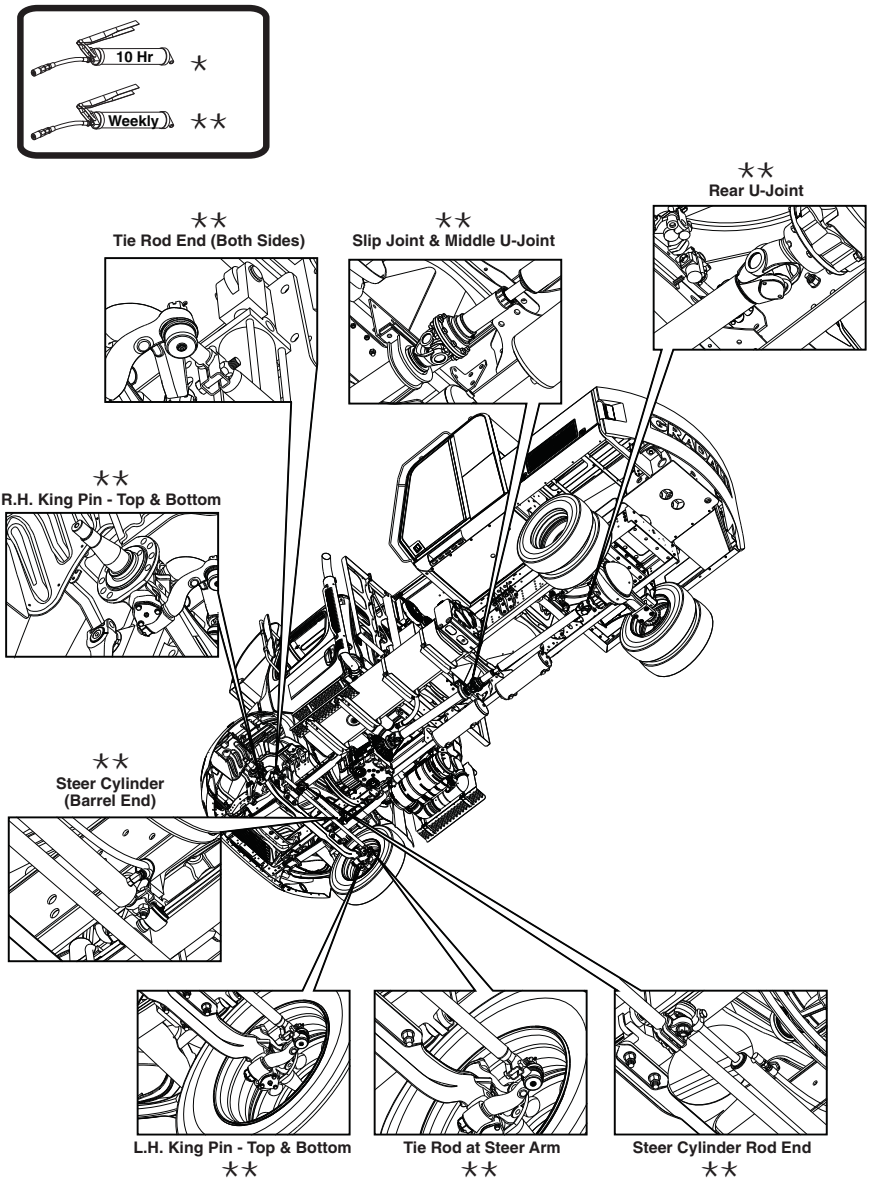


OAC2100

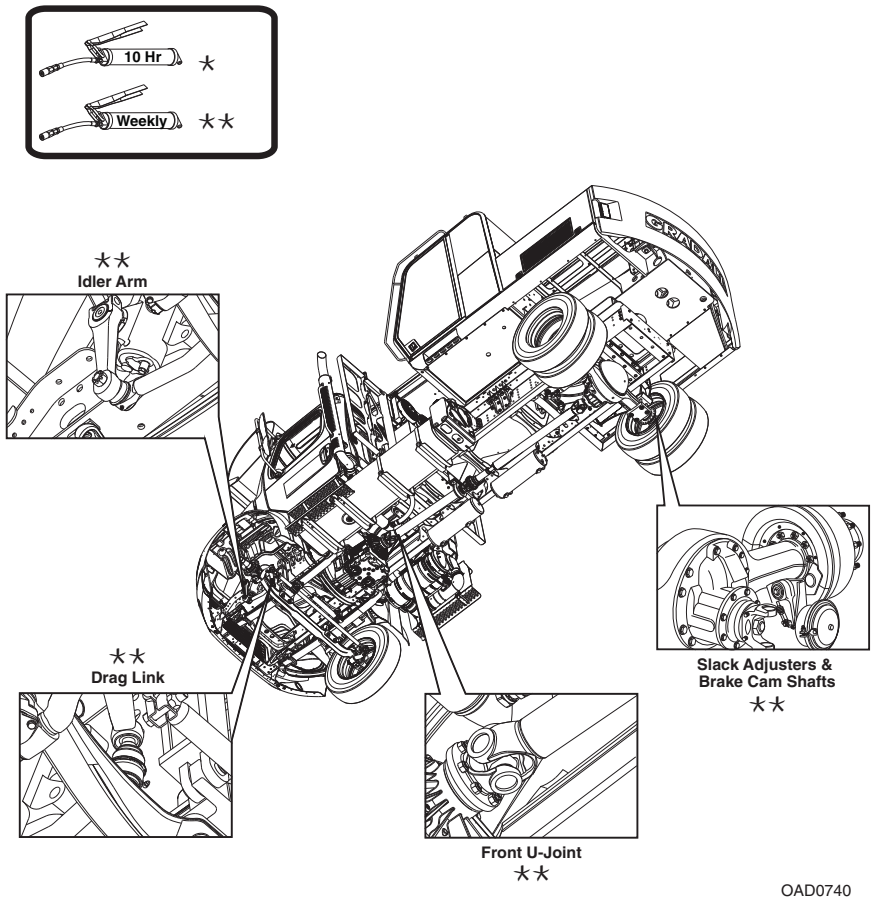
5.4 UPPERSTRUCTURE LUBRICATION SCHEDULE



5.5 UNDERCARRIAGE LUBRICATION SCHEDULE



OAD0730


10 Hr
★
Weekly
★★
★★
Idler Arm
★★
Drag Link
Slack Adjusters &
Brake Cam Shafts
★★
Front U-Joint
★★
OAD0740

SECTION 6 - EMERGENCY PROCEDURES

6.1 LOSS OF POWER

The engine will de-rate if a problem develops. If this occurs, place the boom in the boom rest as soon as possible. Make all necessary repairs before continued operation.

If the machine loses power before the boom is place in the boom rest, follow the procedures below:

Stowing the boom without engine power

Be sure there is enough clearance for the attachment when the boom is in the boom rest by measuring the length from the roller bracket on the main boom to the attachment pivot point. If the distance is less than 6 feet, it will be necessary to extend the boom with another machine by performing the following procedure:

To extend the boom without engine power

1. Attach a test hose to the test fitting for the retract side of the boom circuit.
2. Direct the rod side oil into a waste container as the boom is SLOWLY pulled out.
3. Once the boom is at the proper extension, secure the telescoping boom to the main boom using a chain or strap to keep the boom from further movement.

To raise the boom without engine power

1. If the boom needs to be raised to place in the boom rest, it will be necessary to release the swing brake.
2. Secure the end of the boom to keep the upperstructure from swinging once the swing brake has been released.
3. Release the swing brake using a port-a-power to pressurize the swing brake to a maximum of 500 psi.
4. Attach a chain to the end of the telescoping boom to a machine having sufficient lift capacity and lift height to raise the boom.
5. Be certain that the boom will not contact any obstructions while raising it.
6. Attach a test hose on the rod side of the hoist cylinders to bleed oil into a waste container.
7. Lift the boom SLOWLY, directing the hoist cylinder rod side oil into a container.

8. Once the boom is raised high enough to clear the cab and boom rest, swing into position over the boom rest.
9. While still supporting the boom with another machine, remove the test hose from the hoist up side of the circuit.
10. Attach test hose to the hoist down test fitting, directing oil into a waste container.
11. SLOWLY lower the boom into place squarely on the boom rest.
12. Once the boom is in the rest, use the boom tie-down to secure it.
13. Remove test hoses used for the procedure.
14. Secure the telescope boom to keep it from extending and retracting.
15. Follow the procedure on page 3-22 for shifting the machine into travel mode.

Towing

Towing procedure(s) are located in the Freightliner Chassis Operation Manual.

If You Get Stuck

If unit becomes stuck, you can use the boom to help free it.

- Position undercarriage and upperstructure controls for remote control operation.
- Position boom over rear of undercarriage (centered over rear to prevent tipping) and embed bucket or attachment in ground.

While traveling in appropriate direction, extend or retract boom as required to help push or pull unit to solid ground. Keep wheels in contact with ground.

SECTION 7 - SPECIFICATIONS

7.1 PRODUCT SPECIFICATIONS

Lubrication & Fluid Capacities

Note: *Lubricants described in this table are used in standard machines when they are shipped from Gradall Industries, Inc.*

Hydraulic System

System Capacity .....62 gallons (235 liters)

Type of Oil ..... Mobilfluid® 424 Tractor Hydraulic Fluid (ISO 46)** (p/n 80533031)

Upperstructure Cab Heater

Capacity .....1.3 gallons (4,9 liters)

Type of Fluid.....Conoco Heat Transfer 32 Hydraulic Fluid (p/n 80533049)

Swing Transmission

Capacity ..... 2.47 quarts (2,3 liters)

Type of Fluid.....Gear Oil 80w90 (p/n 80533027)

Swing Brake

Capacity ..... 4 ounces (0,1 liters)

Type of Fluid..... Mobilfluid® 424 Tractor Hydraulic Fluid (ISO 46)** (p/n 80533031)

Tilt Drive

Capacity ..... 43 ounces (1,2 liters)

Type of Fluid.....Gear Oil 80w90 (p/n 80533027)

Grease Fittings

Capacity ..... as required

Type of Lube..... Extreme Pressure Lube #2

***** Capacities are approximate - Check level to be sure
****** Hydraulic Fluid Specifications; Pour Point -46°F., SSU @ 100° F. 275; Flash Point 442° F. Approved Supplier & Type: Mobil Mobilfluid 424

Weight

D152

Operating Weight.....32,200 lb (14,605 kg)

Gross Vehicle Axle Rating .....33,000 lb (14,968 kg)

D154

Operating Weight.....34,500 lb (15,689 kg)

Gross Vehicle Axle Rating .....36,200 lb (16,420 kg)

Note: *Refer to detailed specification sheet for additional machine weight information. Specification sheets can be viewed/downloaded at www.gradall.com*

Dimensions

D152 & D154

Wheelbase..... 15.1 ft (4,8 m)

Ground Clearance .....10 in (254 mm)

Transport Length) ..... 22.0 ft (6,7 m)

Transport Height)..... 12.1 ft (3,7 m)

Transport Width)..... 8.6 ft (2,6 m)

Note: *Refer to detailed specification sheet for additional machine dimension information. Specification sheets can be viewed/downloaded at www.gradall.com*

7.2 TORQUE CHART

To check **Gradall** torque values, set the torque wrench at 95% of the rated torque values and check fastener. If the torque wrench releases before the fastener moves, assume fastener torque is correct. When setting **Gradall** torque values, use the values given on the following chart. DO NOT EXCEED allowances.

Boom Cylinder Mount Plate

Quantity 19

Thread Size (grade) 5/8-11 (5)

Torque (lubricated) ..... 200-215 lb-ft (272-292 Nm)

Swing Bearing

Quantity 68

Thread Size (grade) 5/8-11 (8)

Torque (lubricated) ..... 200-215 lb-ft (272-292 Nm)

Swing Transmission

Quantity 7

Thread Size (grade) 3/4-16 (8)

Torque (lubricated) ..... 340-365 lb-ft (461-496 Nm)

Tilt Bearing

Quantity 58

Thread Size (grade) 3/4-10 (8)

Torque (lubricated) ..... 340-365 lb-ft (461-496 Nm)

Tilt Drive

Quantity 4

Thread Size (grade) 3/4-16 (5)

Torque (lubricated) ..... 235-250 lb-ft (318-338 Nm)

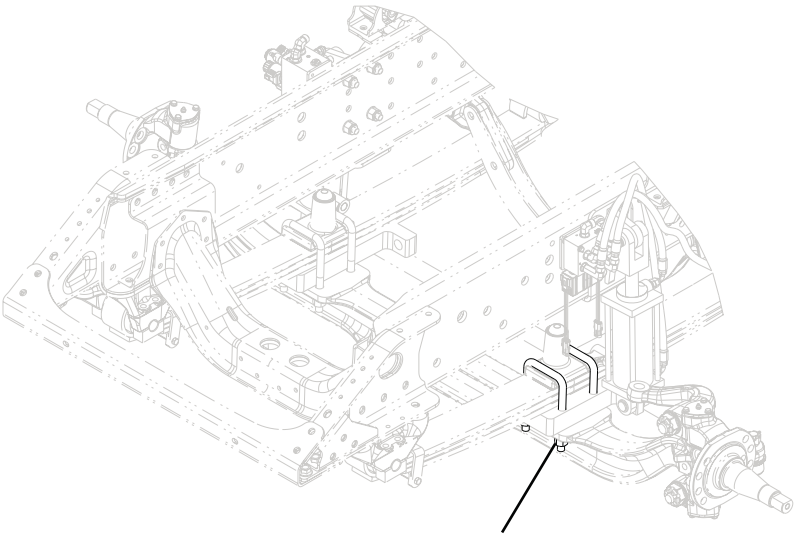
Front Axle Torque Check

D152

- Ensure front axle u-bolt nuts are torqued to 370-395 lb-ft (8 nuts)

D154

- Ensure front axle u-bolt nuts are torqued to 560-595 lb-ft (8 nuts)



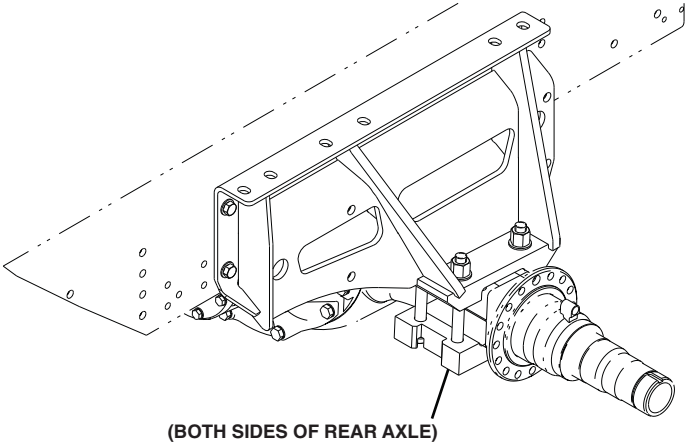
(BOTH SIDES OF FRONT AXLE)

If replacement or torquing of nut(s) is required:

- Remove nut(s), clear threads of existing loctite
- Clear threads of u-bolt(s) of existing loctite.
- Apply loctite (blue 242). (Per loctite manufacturer directions)
- Torque nut(s) to value defined by model designation at top of page.

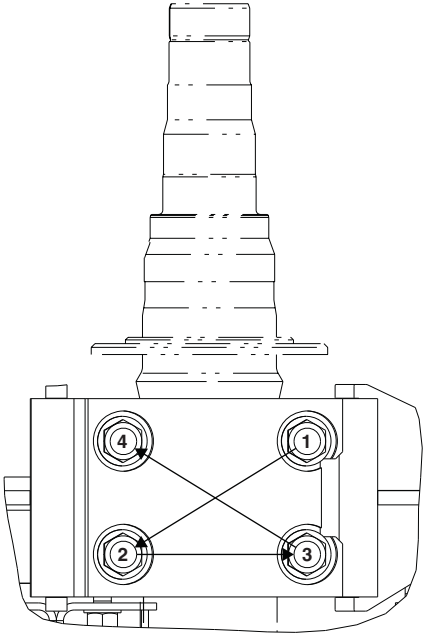
Rear Axle Torque Check

- Ensure rear axle cap screws are torqued to 560-595 lb-ft (8 screws)



OAC2410

If replacement or torquing of cap screw(s) is required, follow the pattern illustrated:



OAC2420

Torque bolts in a 4-stage, criss-cross pattern:
Stage 1 - 150-185 lb-ft
Stage 2 - 280-315 lb-ft
Stage 3 - 470-505 lb-ft
Stage 4 - 560-595 lb-ft

7.3 FUSES

Fuse location and size designations are identified with the decals shown below.

Upperstructure

UPPER FUSE BOX

300

STD or OPT	WIRE	#	DESCRIPTION	RATING
S	AC FAN-301	F1	R1, AC Fan	25
S	AC PWR-302	F2	R1, AC Clutch	10
O	CAB LT-303	F3	R2, Cab Lights	20
O	WORK LT-304	F4	R2, Work Lights	15
S	WASH-305	F5	Washer Fluid	10
S	IGN-306	F6	Ignition (Display, Joysticks, Pedal, Controller)	10
S	IGN-307	F7	Ignition (Valve PWR)	15
O	-	F8	Empty	-
O	-	F9	Empty	-
S	IGN	F10	Ignition Diode	Diode
S	AC	R1	AC Relay	-
O	WORK LT	R2	Work Lights Relay	-
O	BOOM LT	R3	Boom Lights Relay	-
S	HORN	R4	Horn Relay	-
S	IGN-7	R5	Ignition Relay	-

200

STD or OPT	WIRE	#	DESCRIPTION	RATING
S	BAT-201	F1	BAT, (LCD, Main Controller)	5
O	BAT-202	F2	Spare BAT-202, Radio (not required for current radio)	15
S	BAT-203	F3	Diagnostic PWR	10
O	BAT-204	F4	Spare BAT-204	15
O	BAT-205	F5	R3, Boom Lights	20
O	BAT-206	F6	Spare BAT-206	15
S	BAT-207	F7	R4, Horn	15
S	BAT-208	F8	Controller PWR	15
O	-	F9	Empty	-
S	BAT-210	F10	Controller PWR	15
S	ACC-211	F11	LH, Switch, Pod Light and Dome Light PWR	15
S	ACC-212	F12	RH, Switch, Pod Light and Radio PWR	15
O	-	F13	Empty	-
S	ACC-214	F14	Upper Switch PWR	15
O	-	F15	Empty	-
O	ACC-216	F16	Spare ACC-216 and OPT 1 Switch PWR	15
O	ACC-217	F17	Spare ACC-217, OPT 2 Switch and Upper Strobe PWR	15
S	ACC-218	F18	Outlet PWR	10
S	ACC-219	F19	Upper Cab Wiper PWR	20
S	ACC-220	F20	HVAC PWR	25

82173022

OAD0680

Undercarriage

CHASSIS FUSE BOX

100

STD or OPT	WIRE	#	DESCRIPTION	RATING
O	-	F1	Empty	-
O	BAT-102	F2	Spare BAT-102 (Strobe)	15
S	BAT-103	F3	R2, Remote Relay	15
O	BAT-104	F4	Spare BAT-104 (Strobe)	15
O	-	F5	Empty	-
S	BAT-106	F6	Expansion Module PWR	15
S	BAT-107	F7	Upper PWR	20
S	BAT-108	F8	Upper PWR	20
S	BAT-109	F9	Upper PWR	20
S	BAT-110	F10	Upper PWR	20
S	IGN-2	R1	Ignition Relay	-
S	REMOTE	R2	Remote Relay	-
S	PROPEL	R3	Propel Relay (Axle Lock/Dig Brake)	-
S	FAN1	R4	Fan 1 Relay	-
S	FAN2	R5	Fan 2 Relay	-

STD or OPT	WIRE	#	DESCRIPTION	RATING
S	IGN-4	F1	R1, Ignition-4 (Chassis Cab)	15
S	FAN2	F2	R5, Fan 2	30
S	IGN-3	F2	R1, Ignition-3 (Expansion Module, Chassis Switch PWR, Travel Valve PWR)	15
S	FAN1	F4	R4, Fan 1	30

82173021

OAD0690

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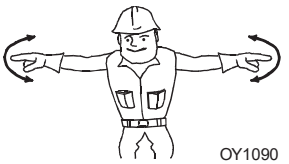
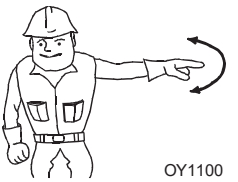
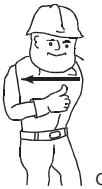
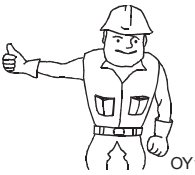
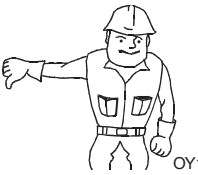
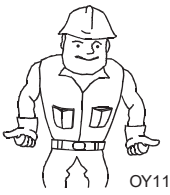
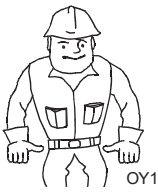
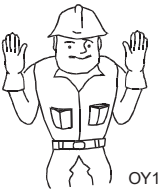
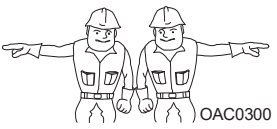
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Hand Signals

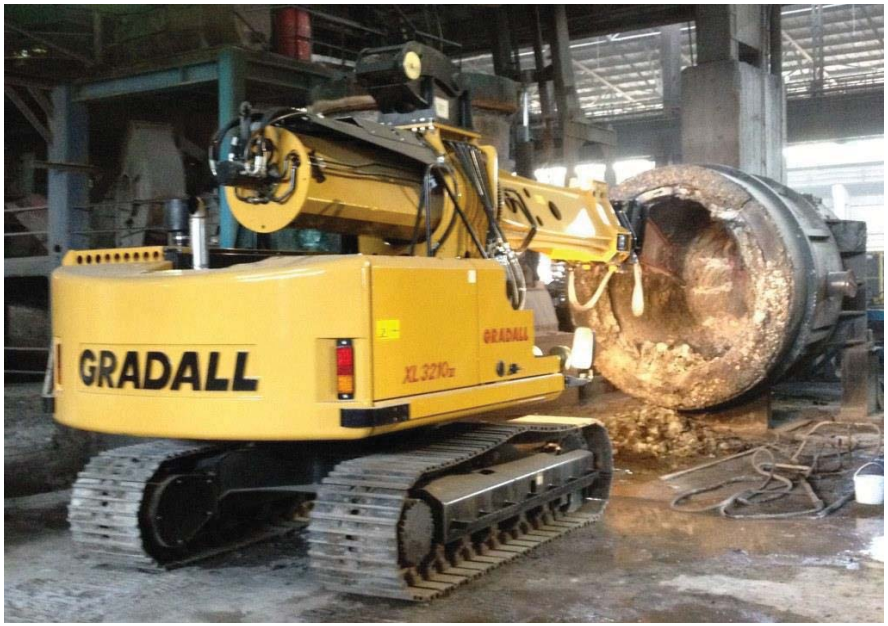
 OY1090	 OY1100	 OY1110
EMERGENCY STOP - With both arms extended laterally, hands open downward, move arms back and forth.	STOP - With either arm extended laterally, hand open downward, move arm back and forth.	STOP ENGINE - Draw thumb or forefinger across throat.
 OY1120	 OY1130	 OY1140
RAISE BOOM - With either arm extended horizontally, fingers closed, point thumb upward.	LOWER BOOM - With either arm extended horizontally, fingers closed, point thumb downward.	MOVE SLOWLY - Place one hand motionless in front of hand giving motion signal. (Raise load slowly shown)
 OY1150	 OY1160	 OY1170
EXTEND BOOM - With both hands clenched, point thumbs outward.	RETRACT BOOM - With both hands clenched, point thumbs inward.	THIS FAR TO GO - With hands raised and open inward, move hands laterally, indicating distance to go.
 OAC0300	 OAC0310	 OAC0320
SWING- With either arm extended horizontally, point with forefinger to direction of swing rotation.	OPEN BUCKET- Hold one hand open and stationary. Rotate other hand in small vertical circle with forefinger pointing horizontally at open hand.	CLOSE BUCKET- Hold one hand closed and stationary. Rotate other hand in small vertical circle with forefinger pointing horizontally at closed hand.

Special Signals - When signals for auxiliary equipment functions or conditions not covered are required, they shall be agreed upon in advance by the operator and signalman.

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BODAS Use & Operation
GRADALL Hydraulic Excavators



BODAS Program Notes

BODAS is used to communicate with *GRADALL* hydraulic excavators equipped with processor controlled hydraulic systems. With BODAS, all processor inputs and outputs (processdata) can be checked using a laptop connected to the machine. System fault codes (Diagnosis) can be viewed. Calibration of pedals and throttle switches can be completed with BODAS.

BODAS has been updated a number of times. The program will have a version number starting with 3.X. The versions of software have some revisions in location of menus and functions. There is also some difference in screen appearance. The version you are using may be different than the screens shown in the program. But, the capabilities and functions remain the same no matter which version you are using.

The processor software also has had revisions. Locations of specific parameters may be different than shown. Certain calibration functions may be different as well. Note early software versions did not have a selection for machine type, later versions do. It is *critical* machine type be set when the software version has machine type selection!

Actual software installation may require assistance from your IT (Information Technology) people. Certain configurations within the computer may need to be changed to allow for proper BODAS operation. The program requires an open port between port #1 through #8. Follow instructions included with the program for installation.

BODAS P/N is 80414109 along with cable kit P/N 80364206. The program uses a serial port for connection to the laptop. You may need an adapter kit to adapt from a USB port to the serial port on the cable. Cables to Go (http://www.cablestogo.com) has an adapter P/N 26886 that works with the program.

For best performance of BODAS, always have your cable connected to the machine and laptop before opening BODAS. Your security key (dongle) must also be installed before opening BODAS. Make sure you allow your computer to recognize both devices before opening BODAS!

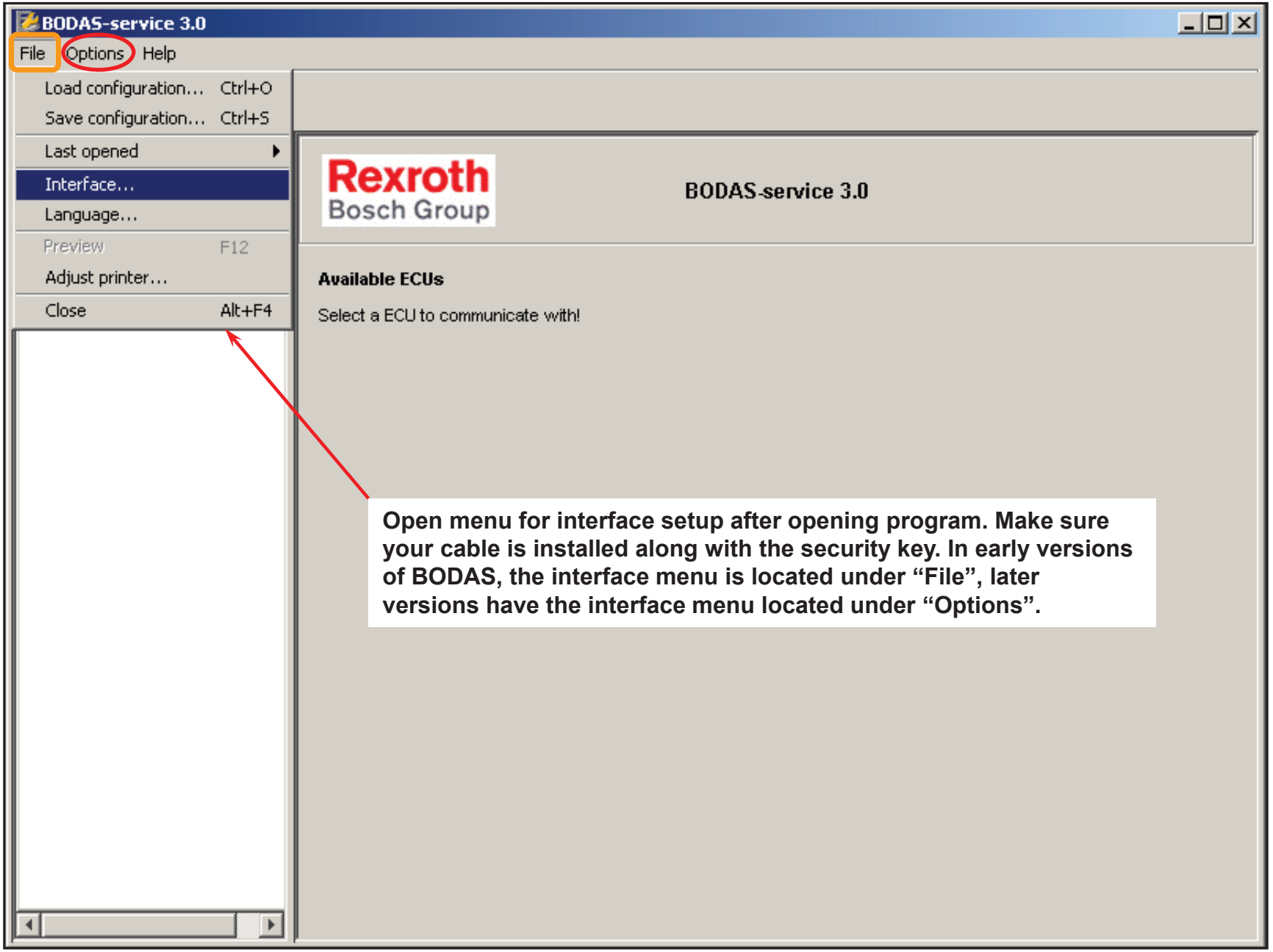
BODAS Program Notes

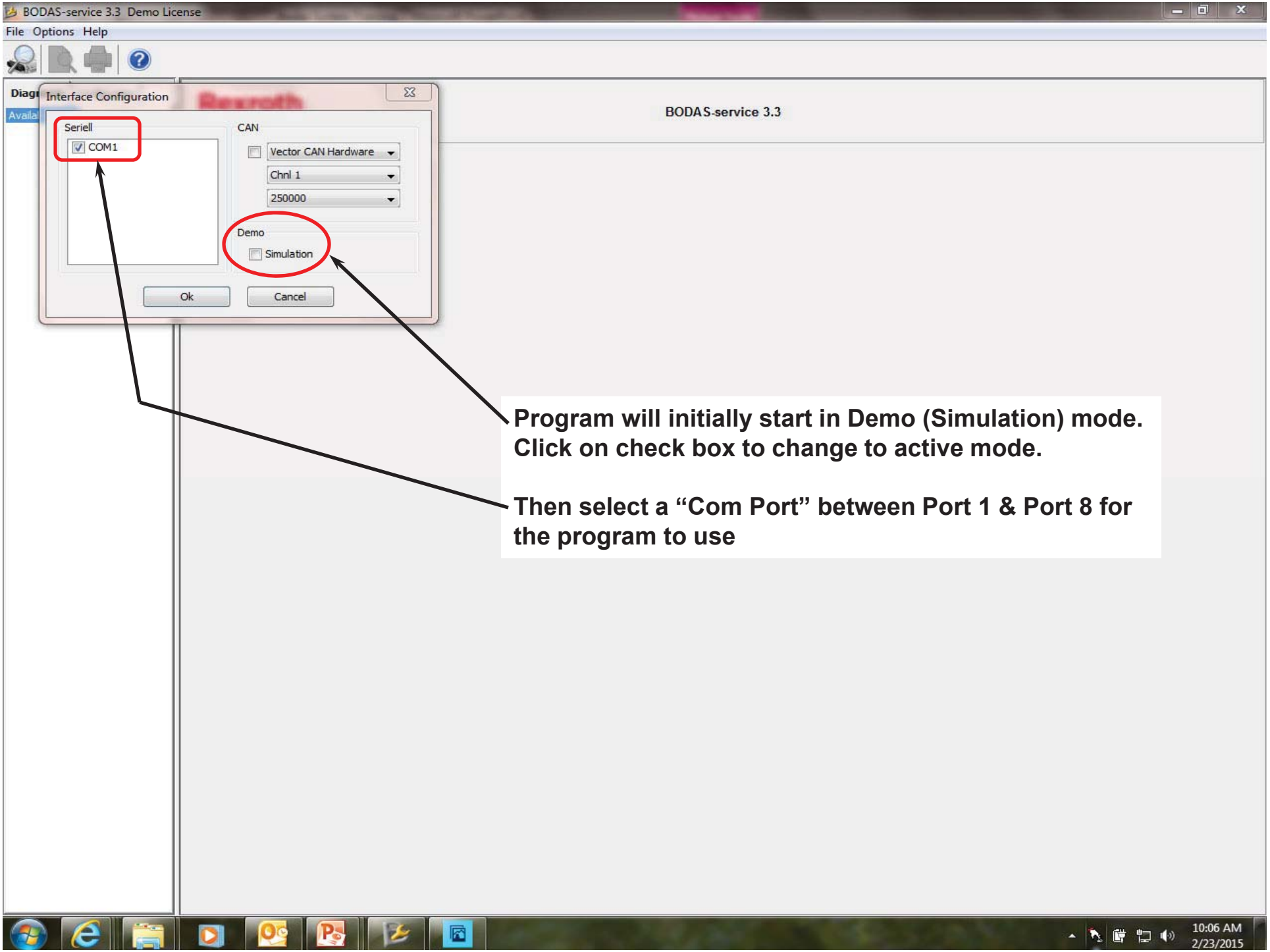
BODAS only looks at inputs and outputs from the processor. Refer to the electrical manual or schematic for actual inputs and outputs to the processor. If an electrical circuit does not go to the processor, you can not troubleshoot the circuit using BODAS.

Note – this manual shows specific screen views of a machine connected to a laptop. Certain values, processor software version, and certain machine functions shown may be different than the machine you are connected to.

On the specific screen views, any notes or instructions are for instructional use. These will not appear on your actual screen within BODAS.

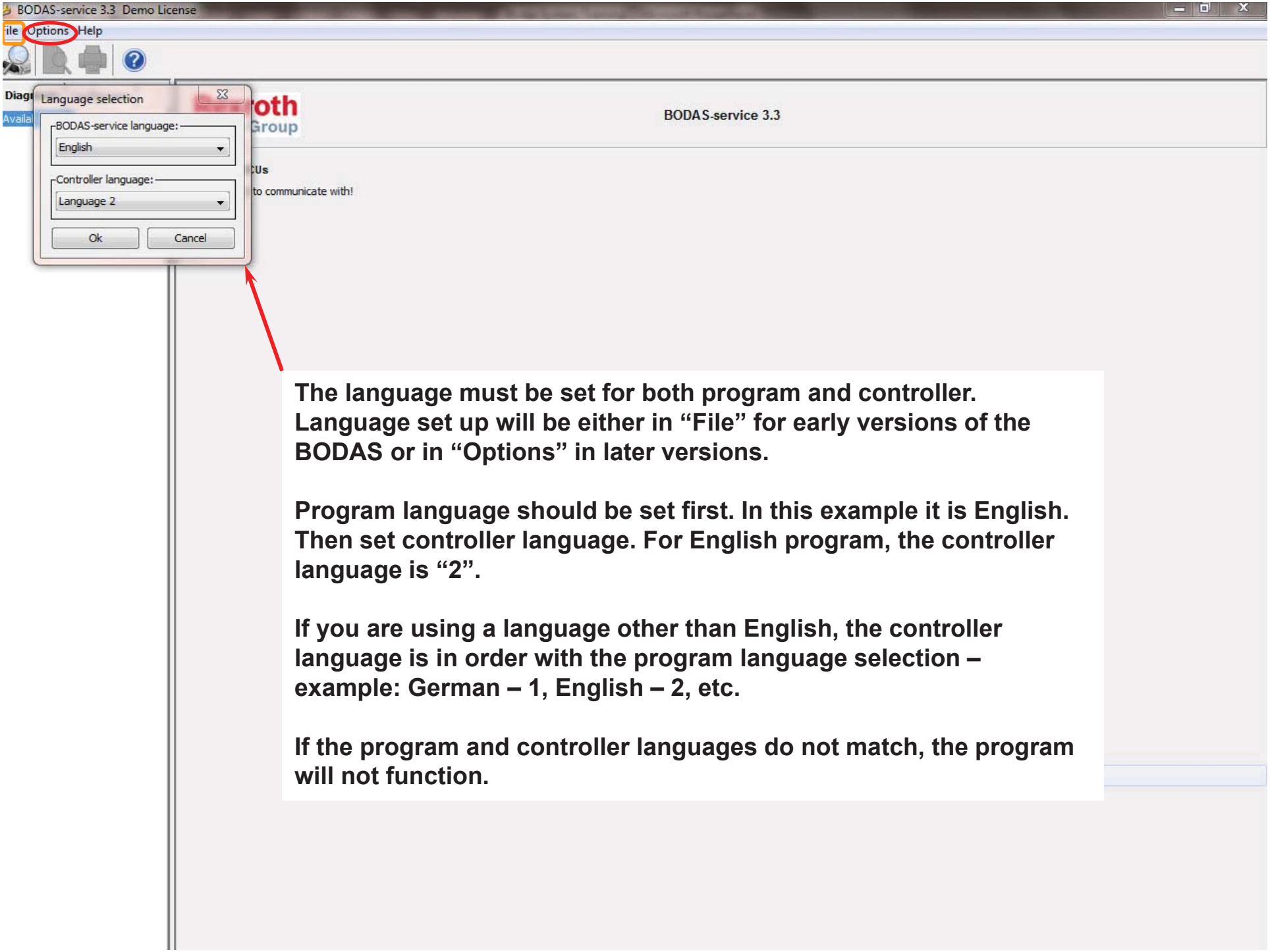
Program Setup





Program will initially start in Demo (Simulation) mode. Click on check box to change to active mode.

Then select a “Com Port” between Port 1 & Port 8 for the program to use



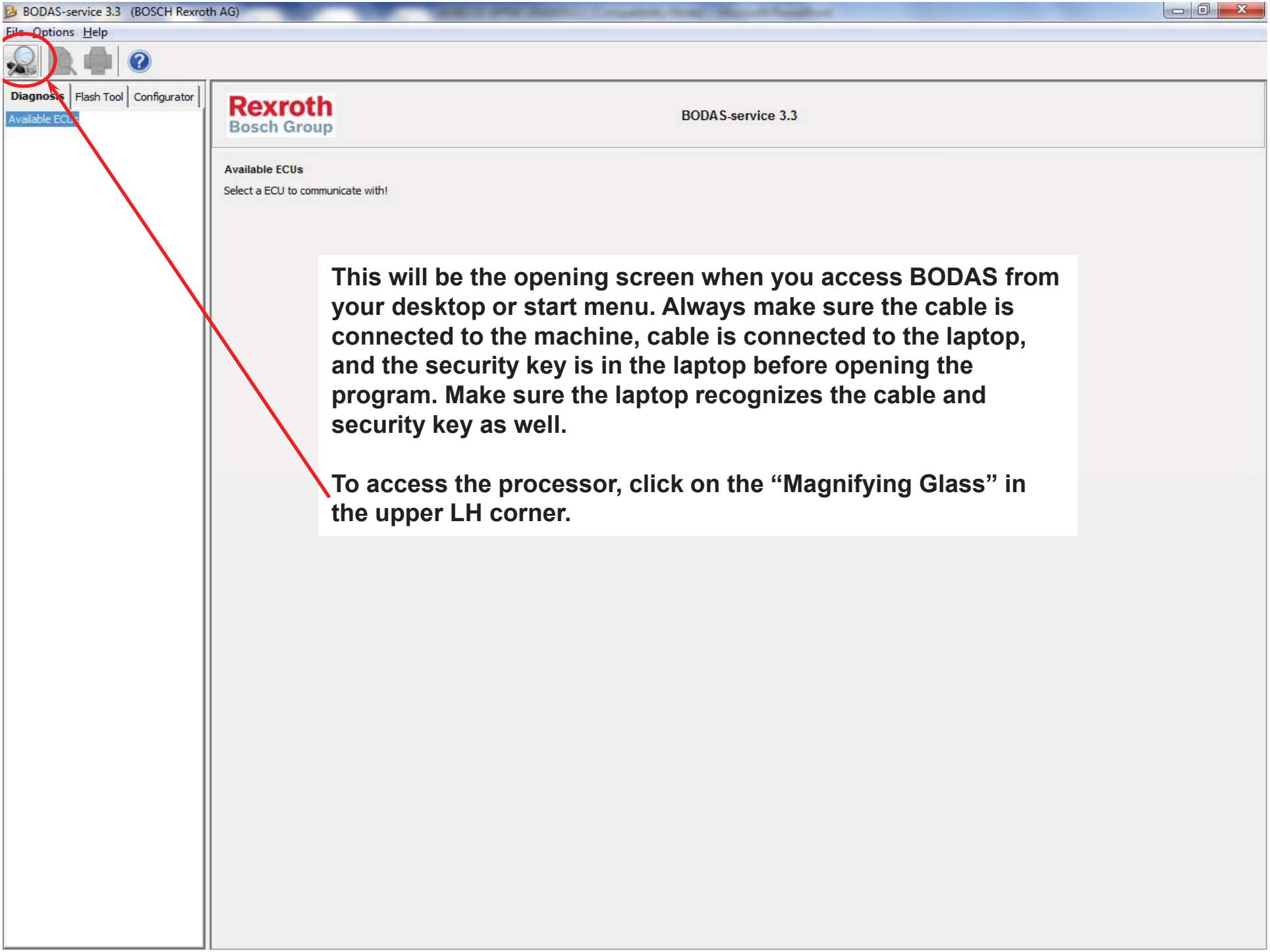
The language must be set for both program and controller. Language set up will be either in “File” for early versions of the BODAS or in “Options” in later versions.

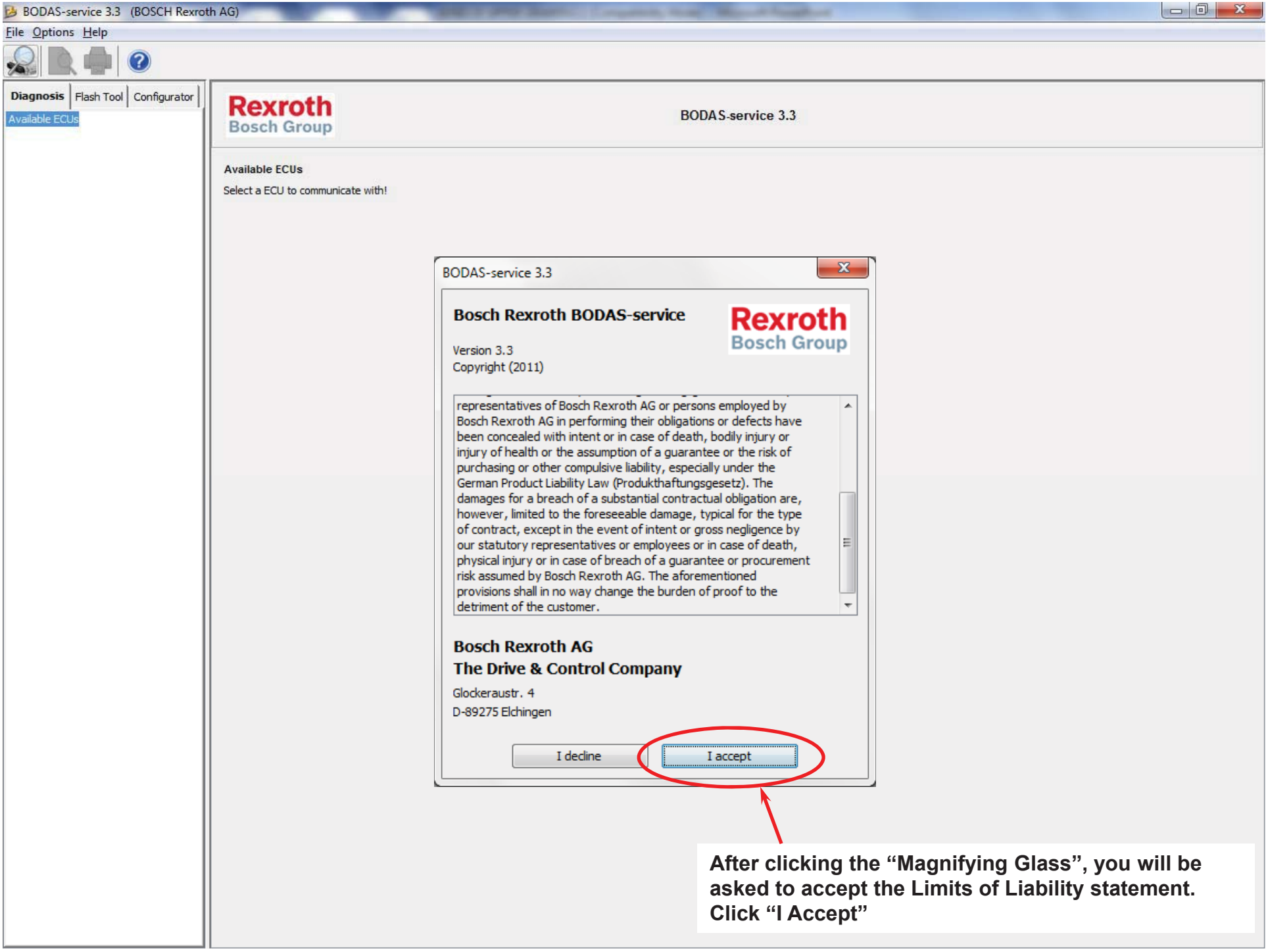
Program language should be set first. In this example it is English. Then set controller language. For English program, the controller language is “2”.

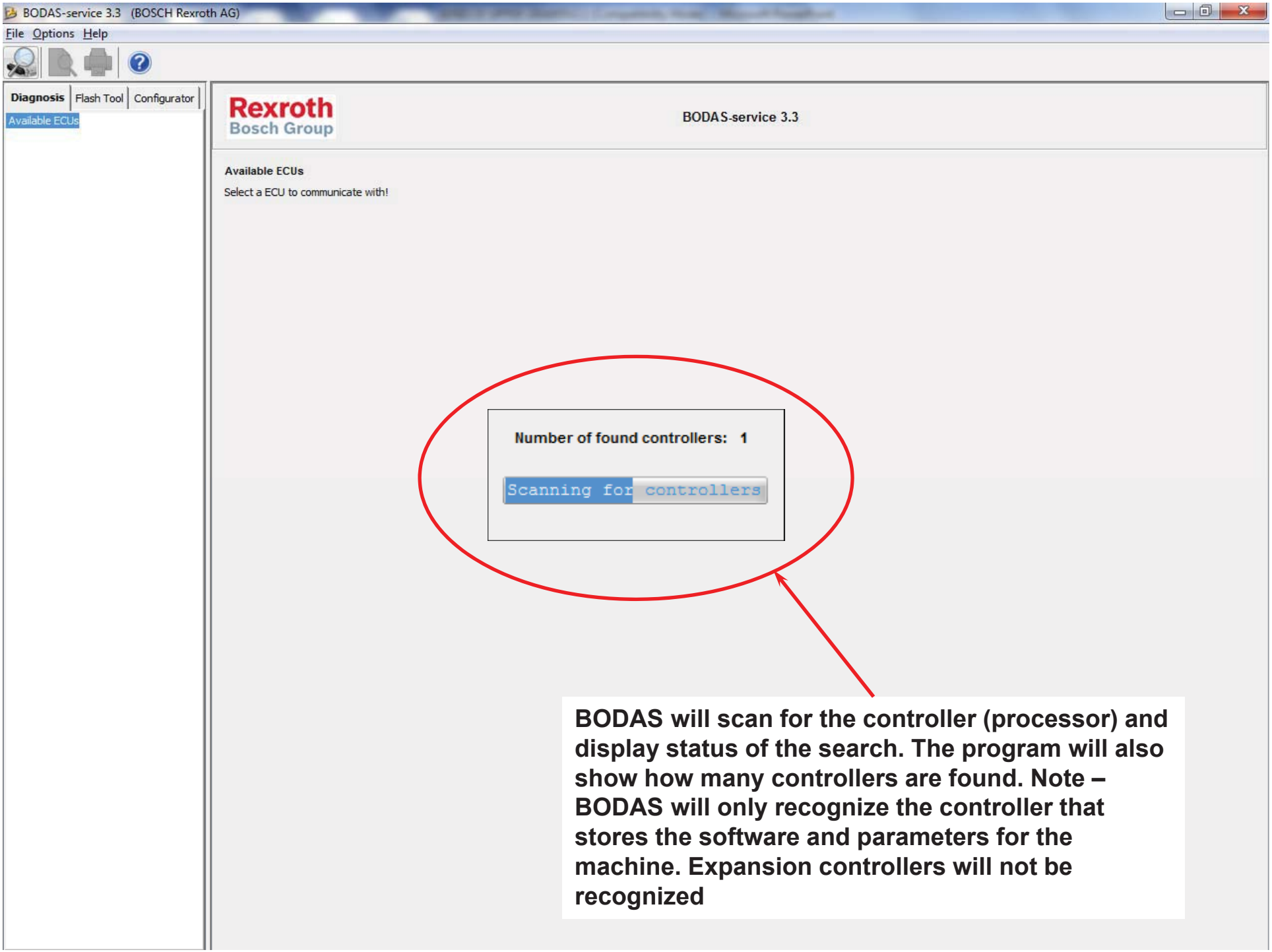
If you are using a language other than English, the controller language is in order with the program language selection – example: German – 1, English – 2, etc.

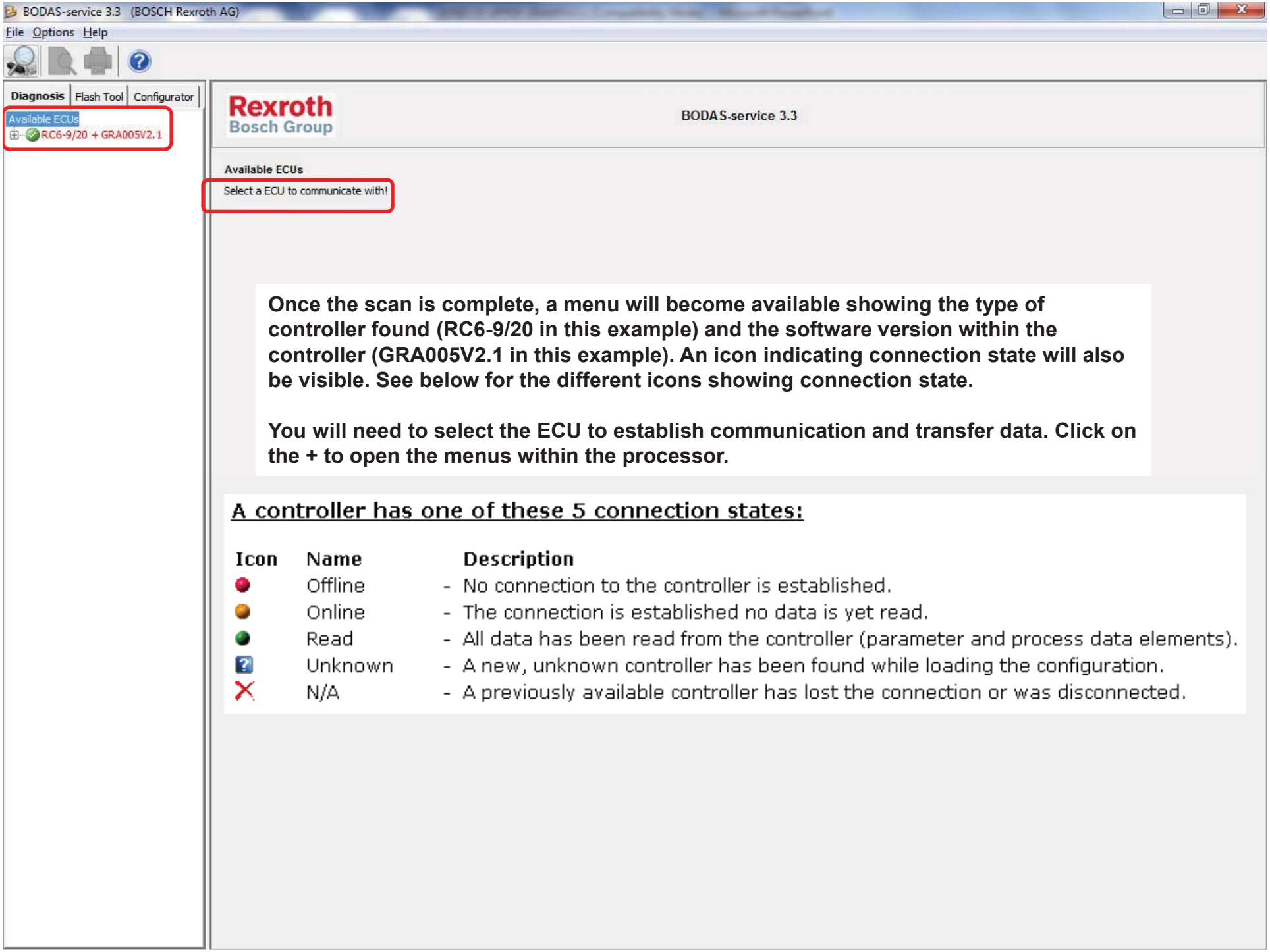
If the program and controller languages do not match, the program will not function.

Using BODAS


BODAS-service 3.3 (BOSCH Rexroth AG)
File Options Help
Diagnosis
Flash Tool
Configurator
Available ECUs
Rexroth
Bosch Group
BODAS-service 3.3
Available ECUs
Select a ECU to communicate with!
This will be the opening screen when you access BODAS from your desktop or start menu. Always make sure the cable is connected to the machine, cable is connected to the laptop, and the security key is in the laptop before opening the program. Make sure the laptop recognizes the cable and security key as well.
To access the processor, click on the “Magnifying Glass” in the upper LH corner.


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Available ECUs
Select a ECU to communicate with!
BODAS-service 3.3
Bosch Rexroth BODAS-service
Rexroth
Bosch Group
Version 3.3
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Bosch Rexroth AG
The Drive & Control Company
Glockeraustr. 4
D-89275 Elchingen
I decline
I accept
After clicking the “Magnifying Glass”, you will be asked to accept the Limits of Liability statement. Click “I Accept”


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BODAS-service 3.3
Available ECUs
Select a ECU to communicate with!
Number of found controllers: 1
Scanning for controllers
BODAS will scan for the controller (processor) and display status of the search. The program will also show how many controllers are found. Note – BODAS will only recognize the controller that stores the software and parameters for the machine. Expansion controllers will not be recognized

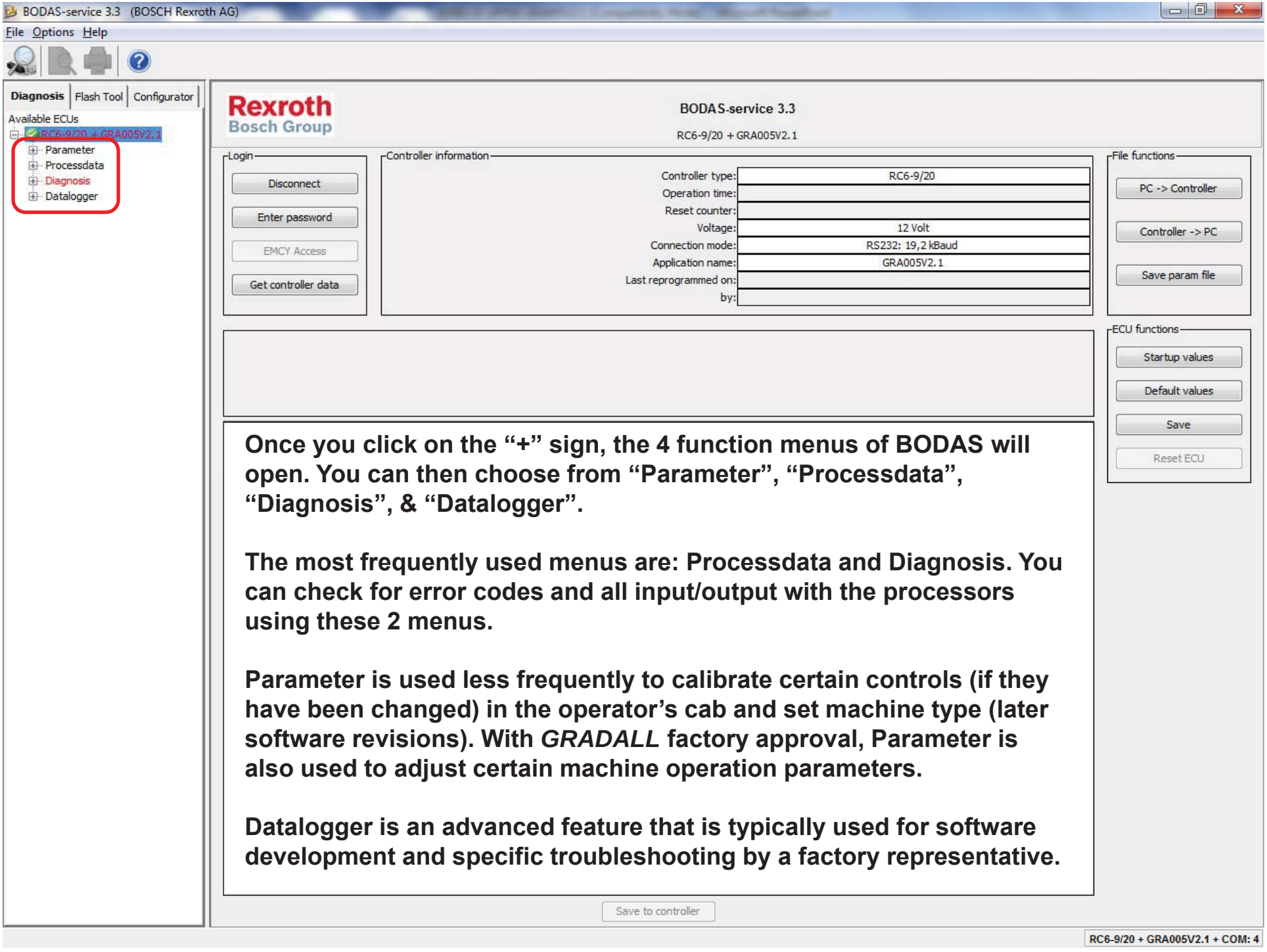


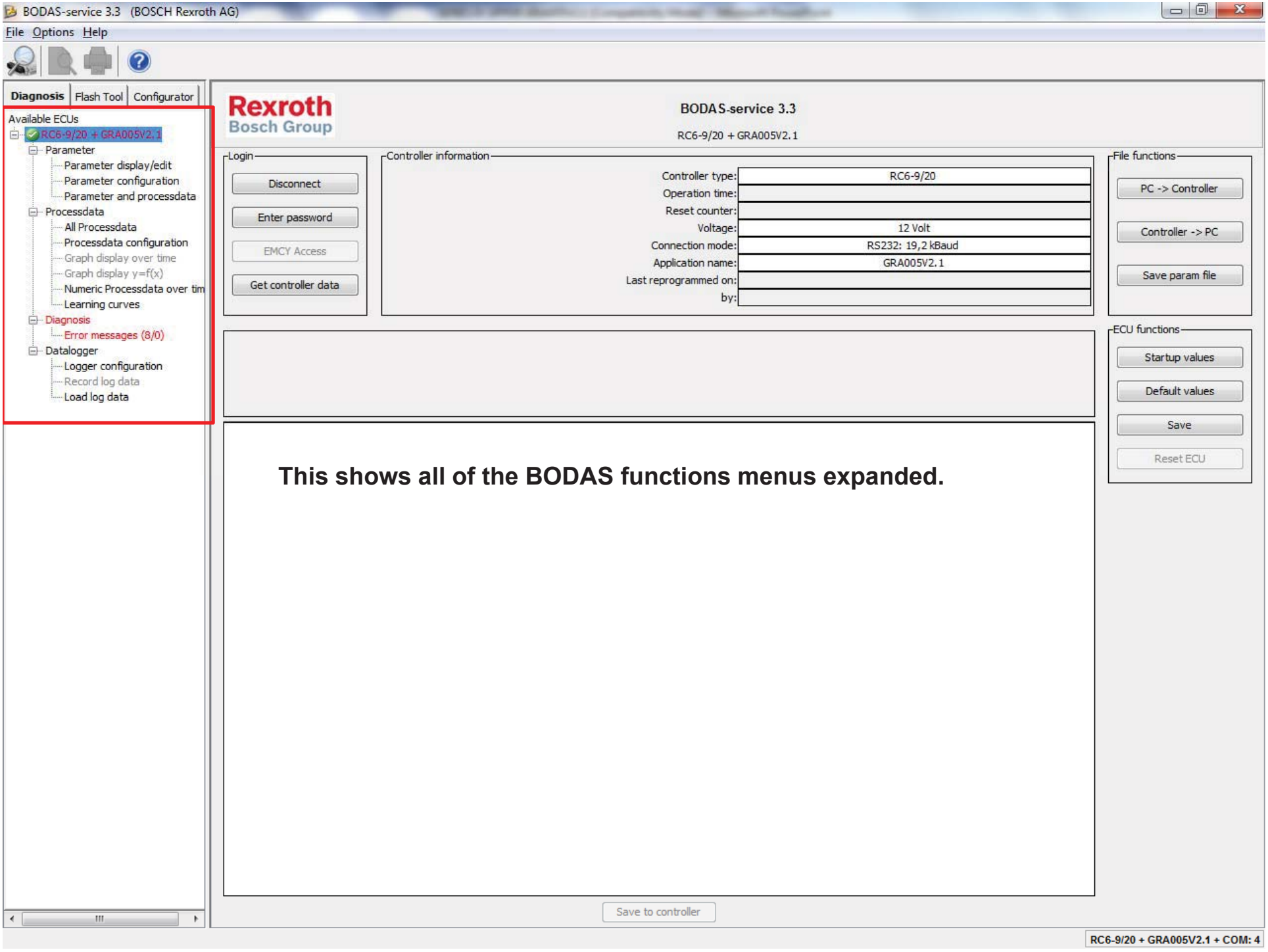
Once the scan is complete, a menu will become available showing the type of controller found (RC6-9/20 in this example) and the software version within the controller (GRA005V2.1 in this example). An icon indicating connection state will also be visible. See below for the different icons showing connection state.

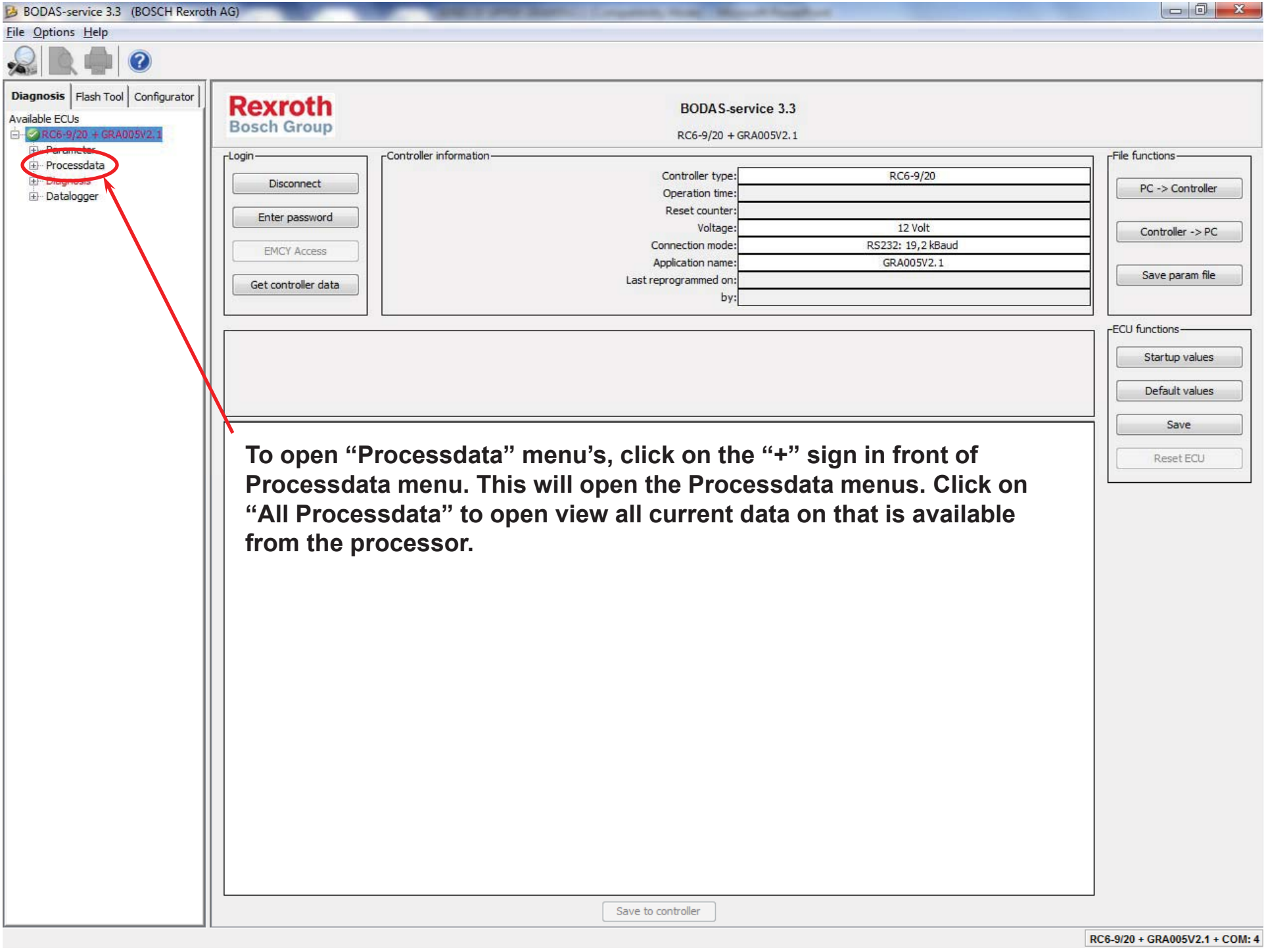
You will need to select the ECU to establish communication and transfer data. Click on the + to open the menus within the processor.

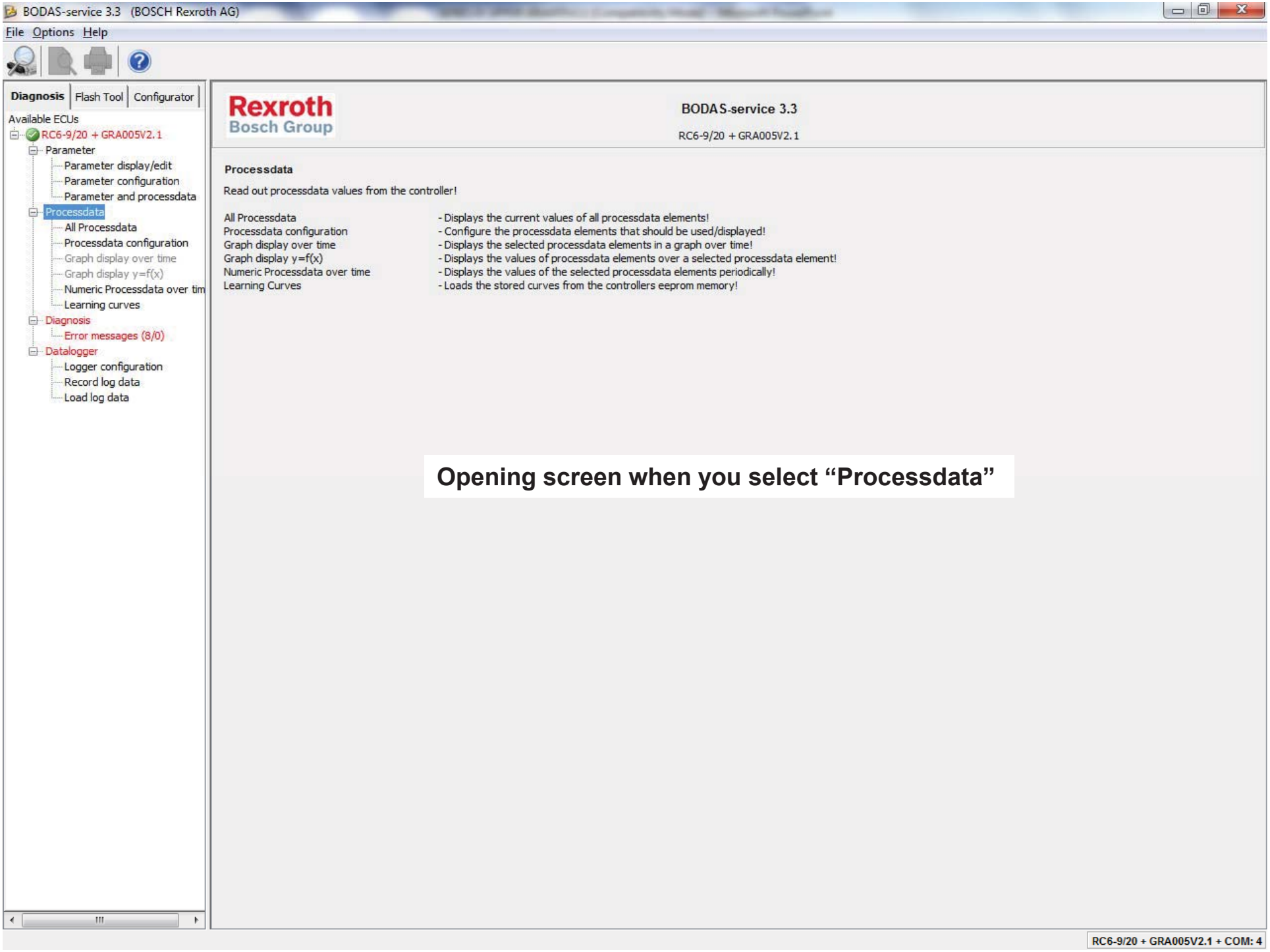
A controller has one of these 5 connection states:

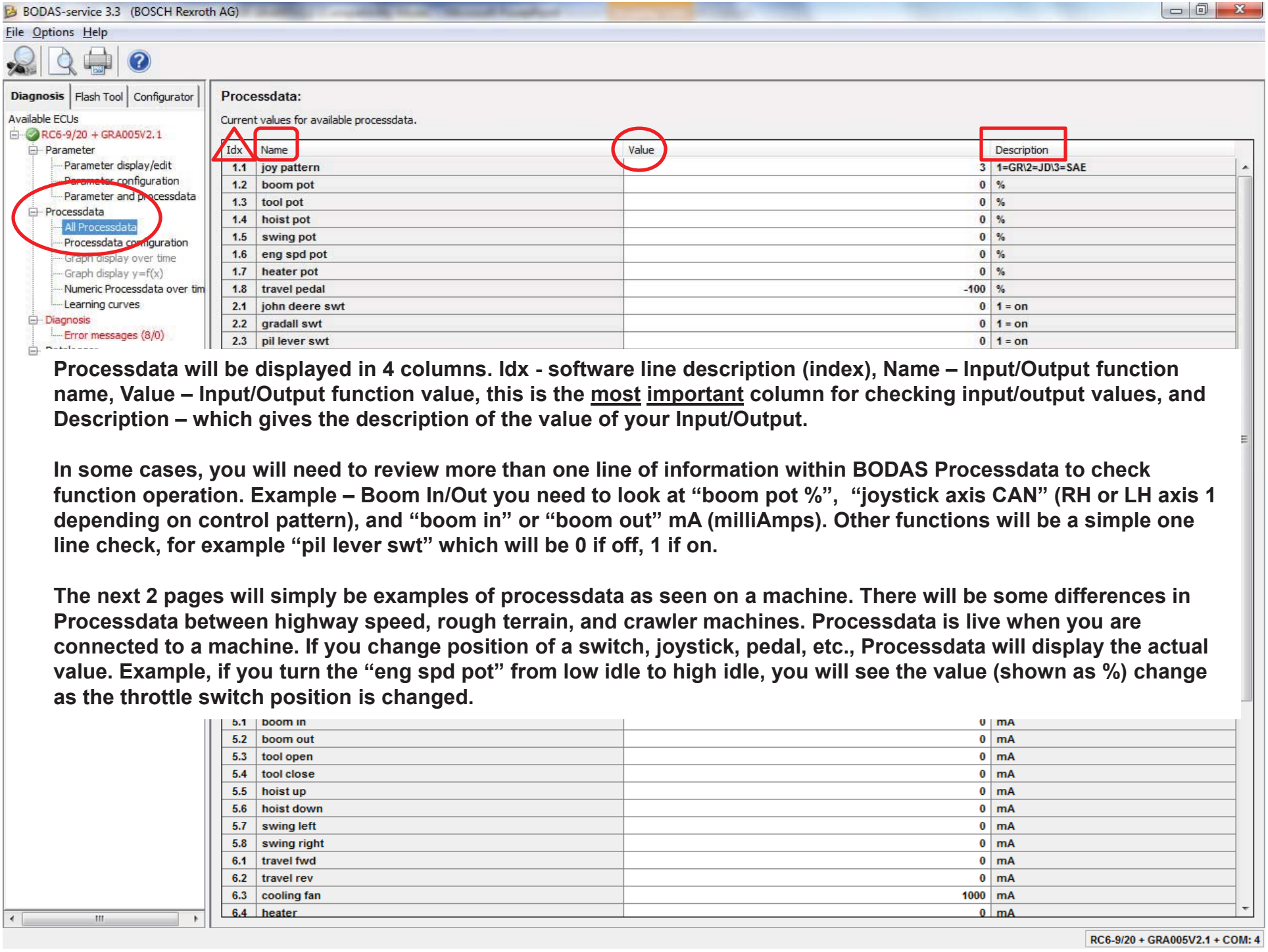
Icon	Name	Description
	Offline	- No connection to the controller is established.
	Online	- The connection is established no data is yet read.
	Read	- All data has been read from the controller (parameter and process data elements).
	Unknown	- A new, unknown controller has been found while loading the configuration.
	N/A	- A previously available controller has lost the connection or was disconnected.


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Login
Disconnect
Enter password
EMCY Access
Get controller data
Controller information
Controller type: RC6-9/20
Operation time:
Reset counter:
Voltage: 12 Volt
Connection mode: RS232: 19,2 kBaud
Application name: GRA005V2.1
Last reprogrammed on:
by:
File functions
PC -> Controller
Controller -> PC
Save param file
ECU functions
Startup values
Default values
Save
Reset ECU
Once you click on the “+” sign, the 4 function menus of BODAS will open. You can then choose from “Parameter”, “Processdata”, “Diagnosis”, & “Datalogger”.
The most frequently used menus are: Processdata and Diagnosis. You can check for error codes and all input/output with the processors using these 2 menus.
Parameter is used less frequently to calibrate certain controls (if they have been changed) in the operator’s cab and set machine type (later software revisions). With GRADALL factory approval, Parameter is also used to adjust certain machine operation parameters.
Datalogger is an advanced feature that is typically used for software development and specific troubleshooting by a factory representative.
Save to controller
RC6-9/20 + GRA005V2.1 + COM: 4


BODAS-service 3.3 (BOSCH Rexroth AG)
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Login
Disconnect
Enter password
EMCY Access
Get controller data
Controller information
Controller type: RC6-9/20
Operation time:
Reset counter:
Voltage: 12 Volt
Connection mode: RS232: 19,2 kBaud
Application name: GRA005V2.1
Last reprogrammed on:
by:
File functions
PC -> Controller
Controller -> PC
Save param file
ECU functions
Startup values
Default values
Save
Reset ECU
This shows all of the BODAS functions menus expanded.
Save to controller
RC6-9/20 + GRA005V2.1 + COM: 4


BODAS-service 3.3 (BOSCH Rexroth AG)
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Login
Disconnect
Enter password
EMCY Access
Get controller data
Controller information
Controller type: RC6-9/20
Operation time:
Reset counter:
Voltage: 12 Volt
Connection mode: RS232: 19,2 kBaud
Application name: GRA005V2.1
Last reprogrammed on:
by:
File functions
PC -> Controller
Controller -> PC
Save param file
ECU functions
Startup values
Default values
Save
Reset ECU
To open “Processdata” menu’s, click on the “+” sign in front of Processdata menu. This will open the Processdata menus. Click on “All Processdata” to open view all current data on that is available from the processor.
Save to controller
RC6-9/20 + GRA005V2.1 + COM: 4

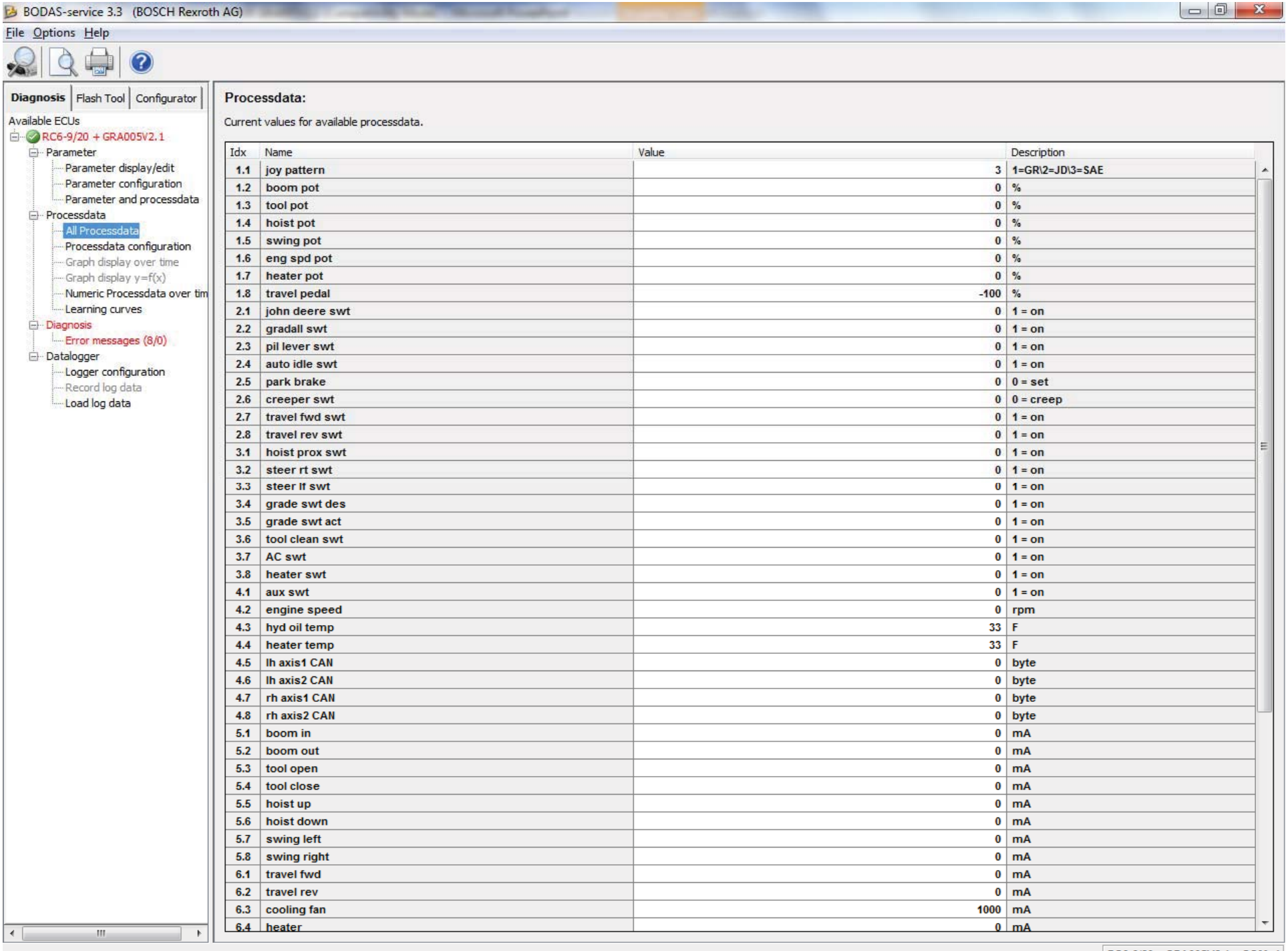

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RC6-9/20 + GRA005V2.1
Processdata
Read out processdata values from the controller!
All Processdata - Displays the current values of all processdata elements!
Processdata configuration - Configure the processdata elements that should be used/displayed!
Graph display over time - Displays the selected processdata elements in a graph over time!
Graph display y=f(x) - Displays the values of processdata elements over a selected processdata element!
Numeric Processdata over time - Displays the values of the selected processdata elements periodically!
Learning Curves - Loads the stored curves from the controllers eeprom memory!
Opening screen when you select “Processdata”
RC6-9/20 + GRA005V2.1 + COM: 4



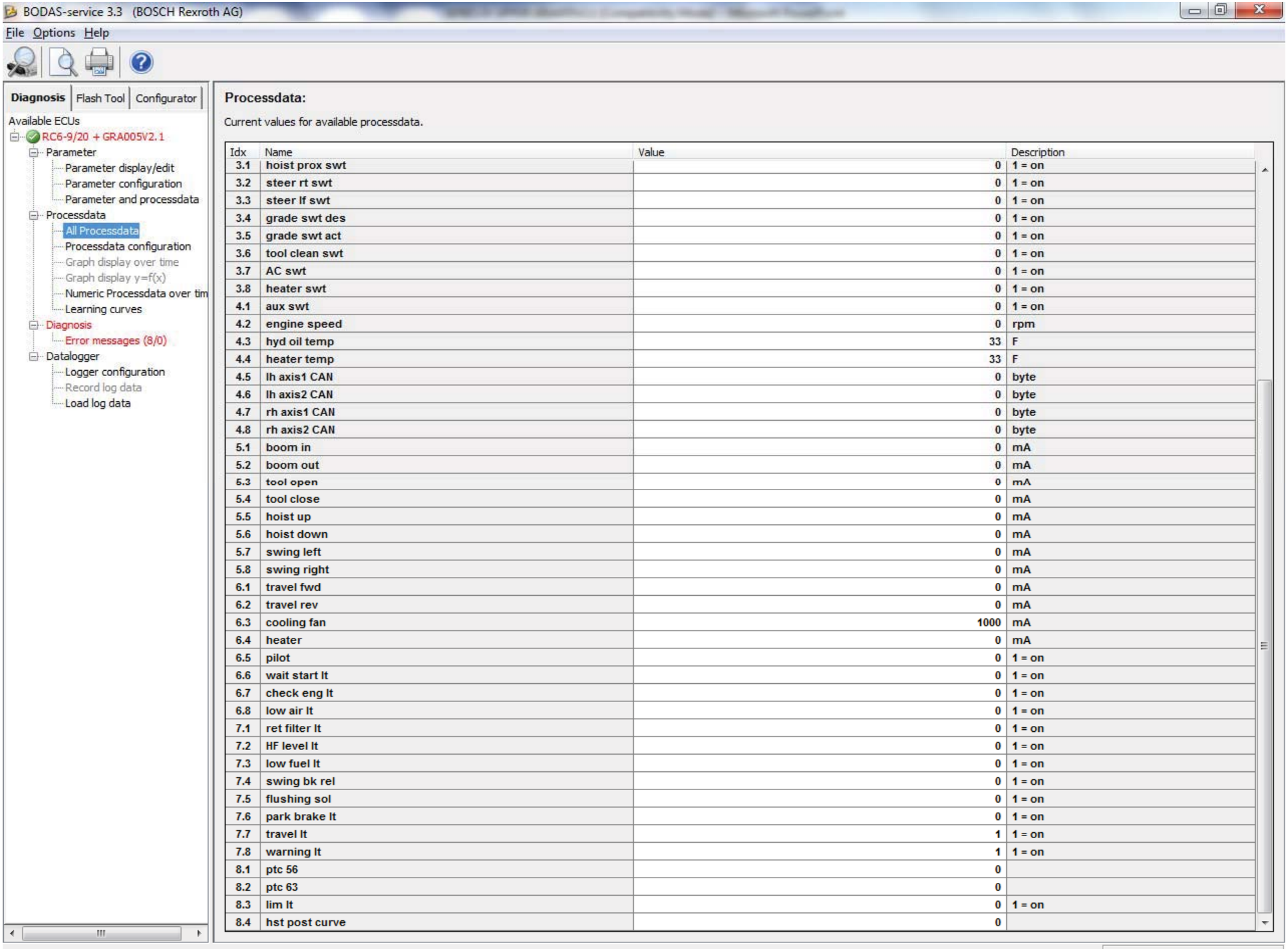
Processdata will be displayed in 4 columns. Idx - software line description (index), Name – Input/Output function name, Value – Input/Output function value, this is the most important column for checking input/output values, and Description – which gives the description of the value of your Input/Output.

In some cases, you will need to review more than one line of information within BODAS Processdata to check function operation. Example – Boom In/Out you need to look at "boom pot %", "joystick axis CAN" (RH or LH axis 1 depending on control pattern), and "boom in" or "boom out" mA (milliAmps). Other functions will be a simple one line check, for example "pil lever swt" which will be 0 if off, 1 if on.

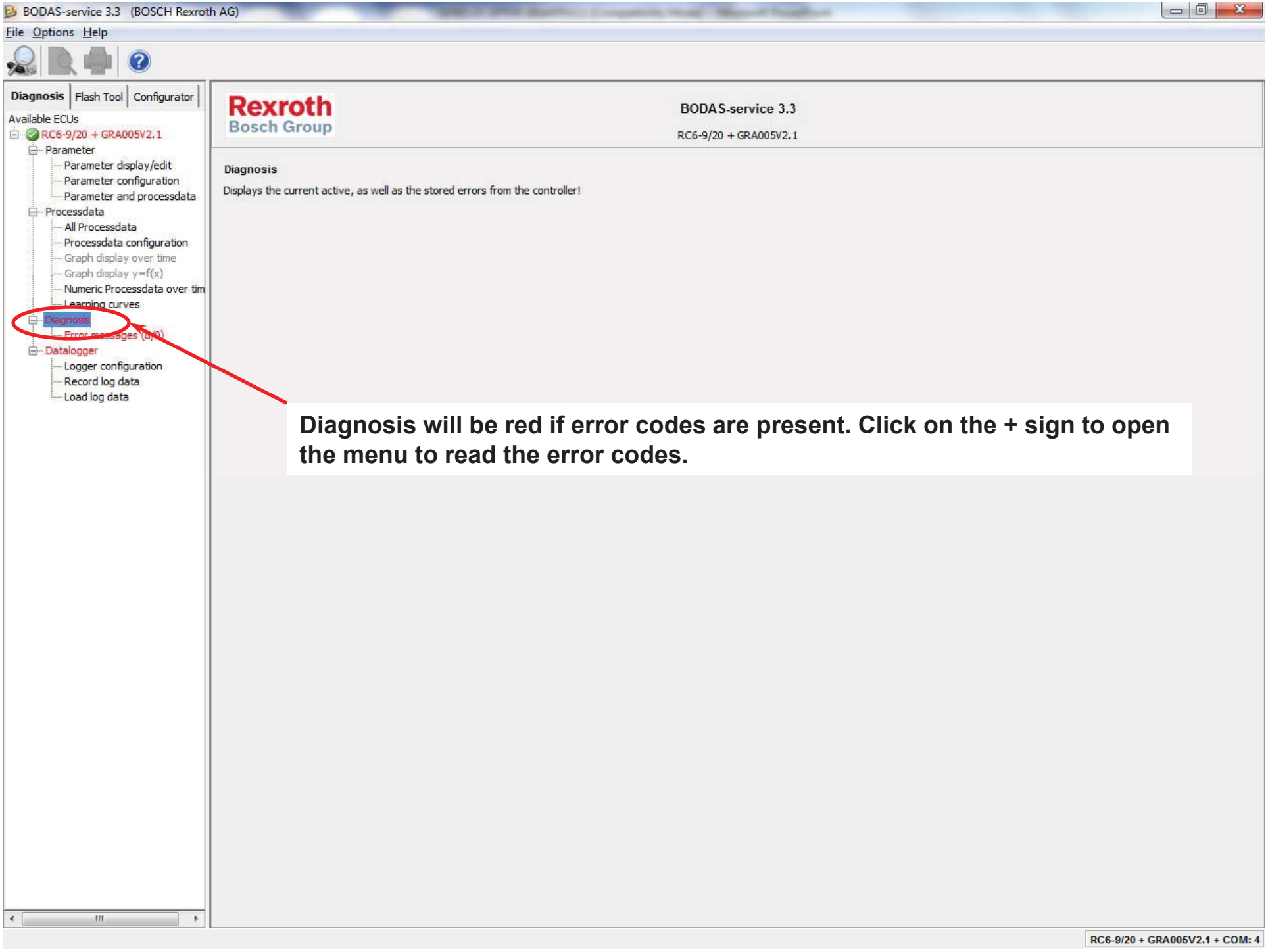
The next 2 pages will simply be examples of processdata as seen on a machine. There will be some differences in Processdata between highway speed, rough terrain, and crawler machines. Processdata is live when you are connected to a machine. If you change position of a switch, joystick, pedal, etc., Processdata will display the actual value. Example, if you turn the "eng spd pot" from low idle to high idle, you will see the value (shown as %) change as the throttle switch position is changed.

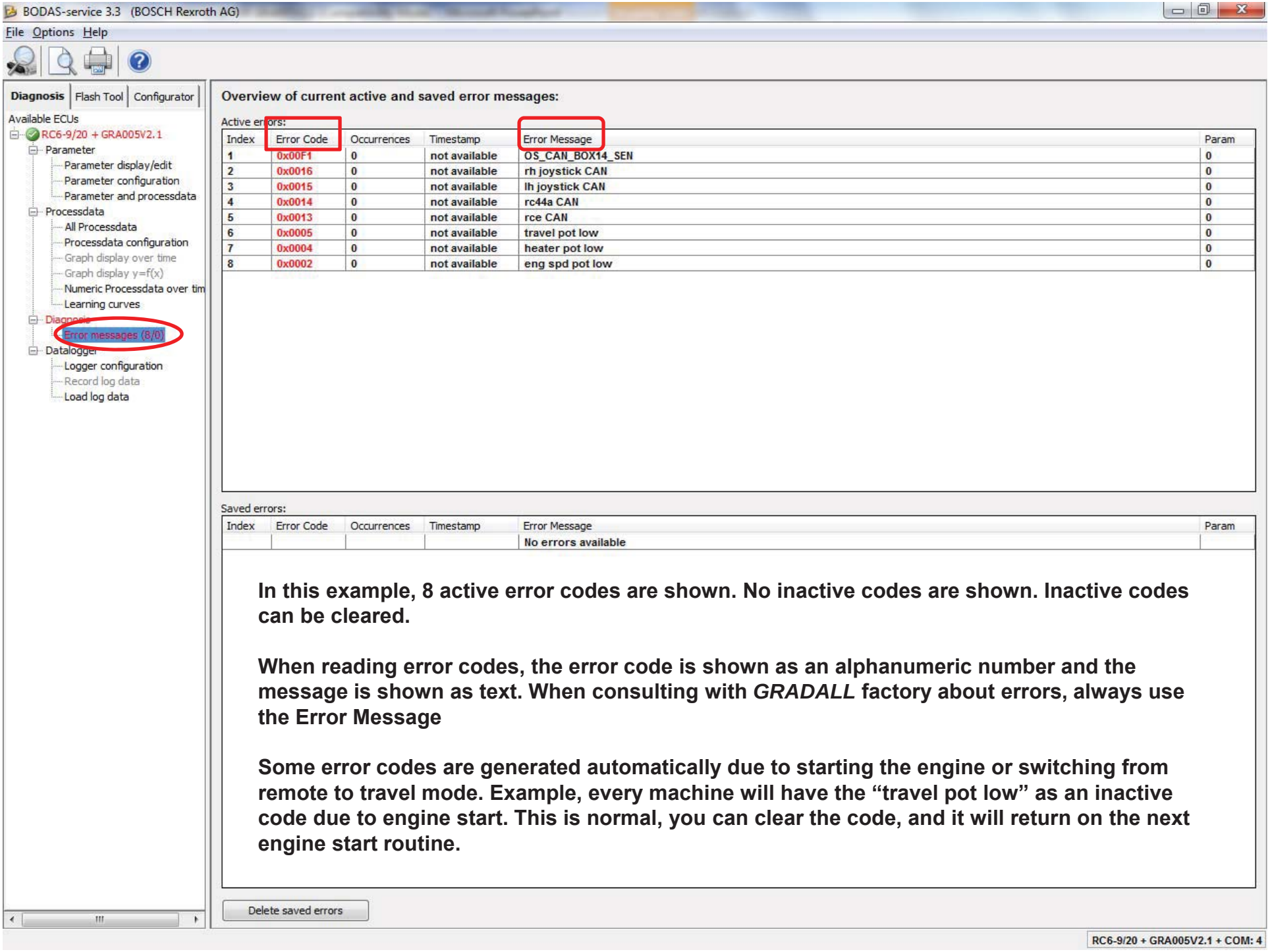


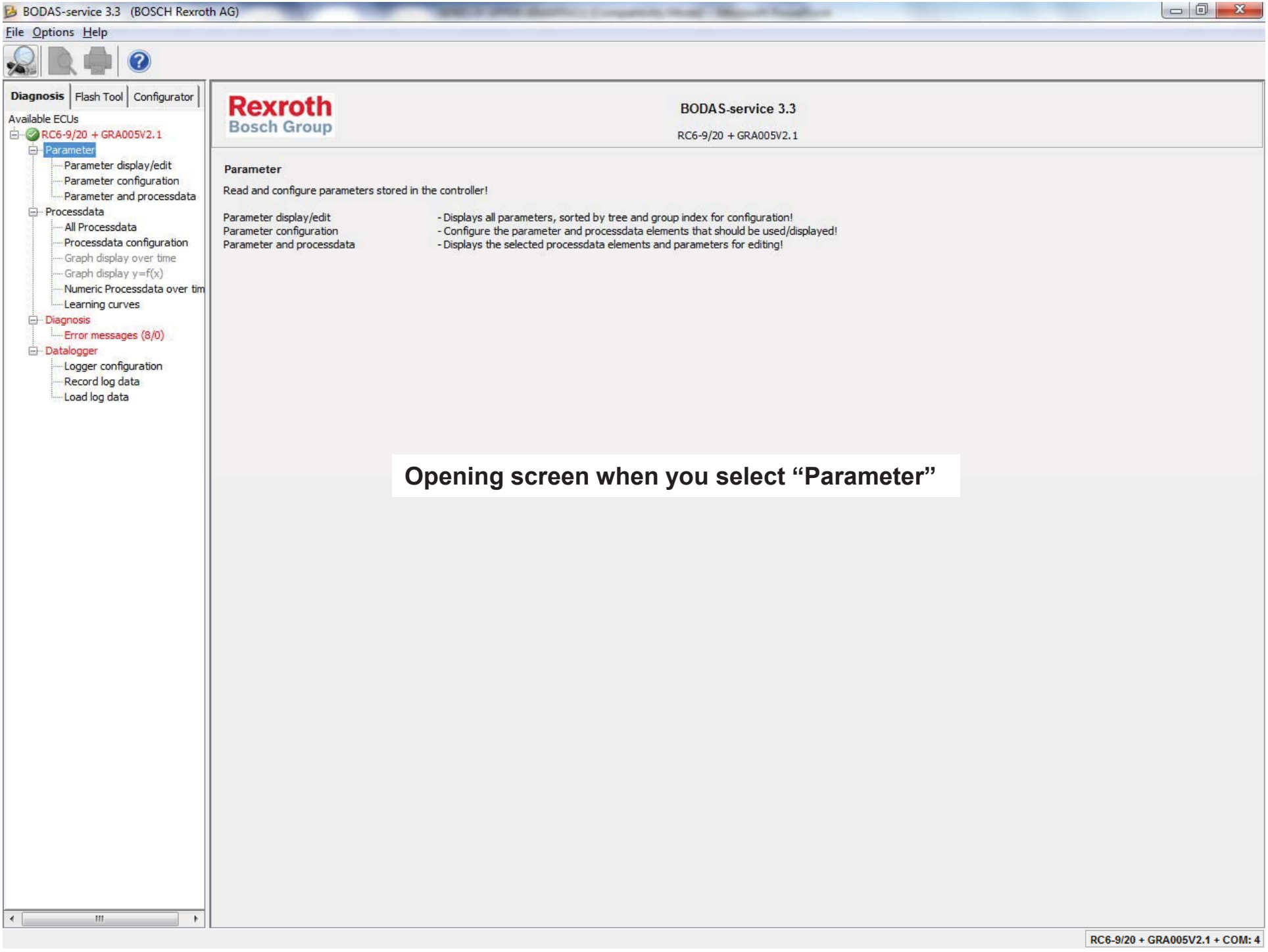
Idx	Name	Value	Description
1.1	joy pattern	3	1=GR\2=JD\3=SAE
1.2	boom pot	0	%
1.3	tool pot	0	%
1.4	hoist pot	0	%
1.5	swing pot	0	%
1.6	eng spd pot	0	%
1.7	heater pot	0	%
1.8	travel pedal	-100	%
2.1	john deere swt	0	1 = on
2.2	gradall swt	0	1 = on
2.3	pil lever swt	0	1 = on
2.4	auto idle swt	0	1 = on
2.5	park brake	0	0 = set
2.6	creeper swt	0	0 = creep
2.7	travel fwd swt	0	1 = on
2.8	travel rev swt	0	1 = on
3.1	hoist prox swt	0	1 = on
3.2	steer rt swt	0	1 = on
3.3	steer lf swt	0	1 = on
3.4	grade swt des	0	1 = on
3.5	grade swt act	0	1 = on
3.6	tool clean swt	0	1 = on
3.7	AC swt	0	1 = on
3.8	heater swt	0	1 = on
4.1	aux swt	0	1 = on
4.2	engine speed	0	rpm
4.3	hyd oil temp	33	F
4.4	heater temp	33	F
4.5	lh axis1 CAN	0	byte
4.6	lh axis2 CAN	0	byte
4.7	rh axis1 CAN	0	byte
4.8	rh axis2 CAN	0	byte
5.1	boom in	0	mA
5.2	boom out	0	mA
5.3	tool open	0	mA
5.4	tool close	0	mA
5.5	hoist up	0	mA
5.6	hoist down	0	mA
5.7	swing left	0	mA
5.8	swing right	0	mA
6.1	travel fwd	0	mA
6.2	travel rev	0	mA
6.3	cooling fan	1000	mA
6.4	heater	0	mA

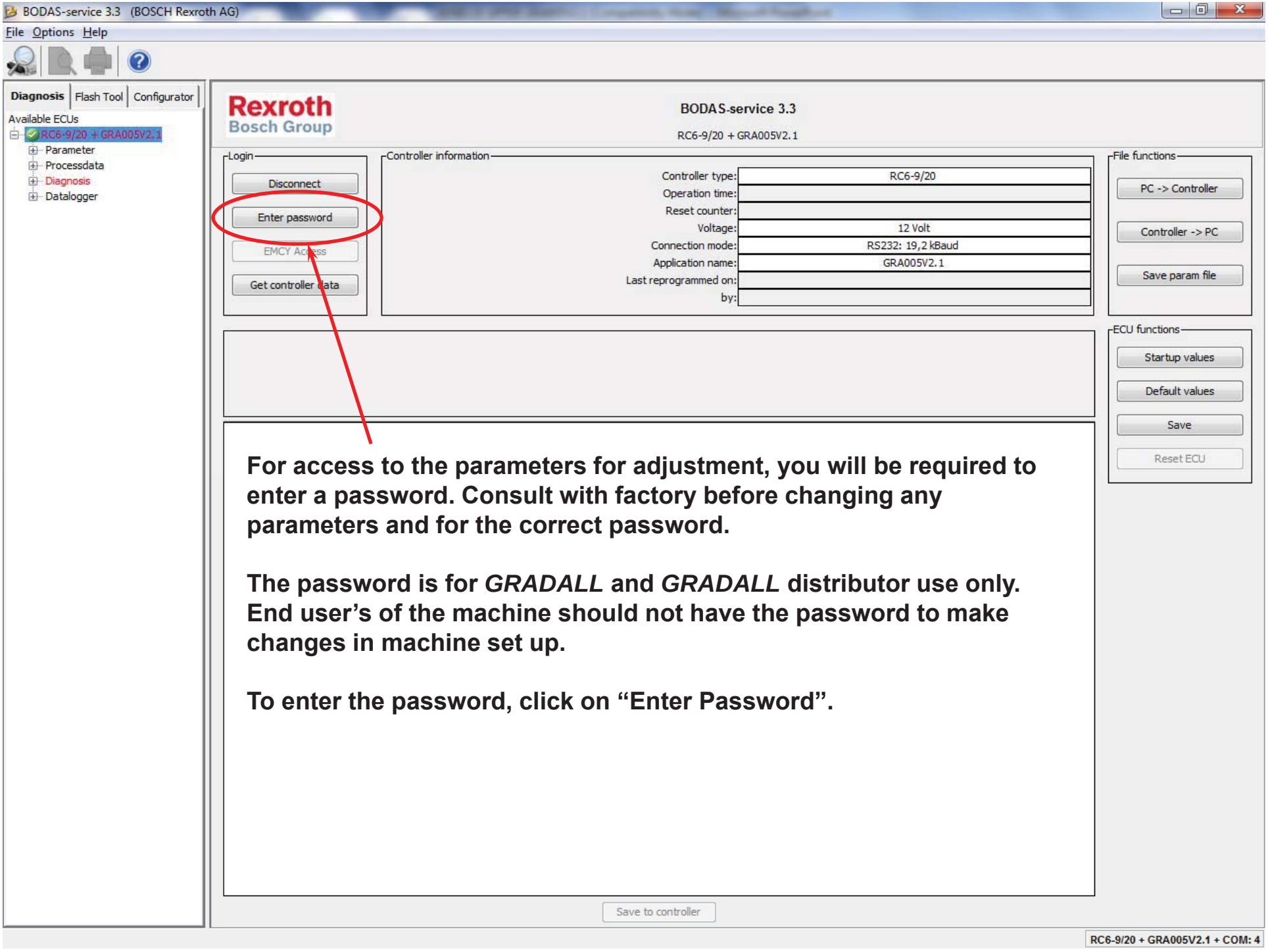


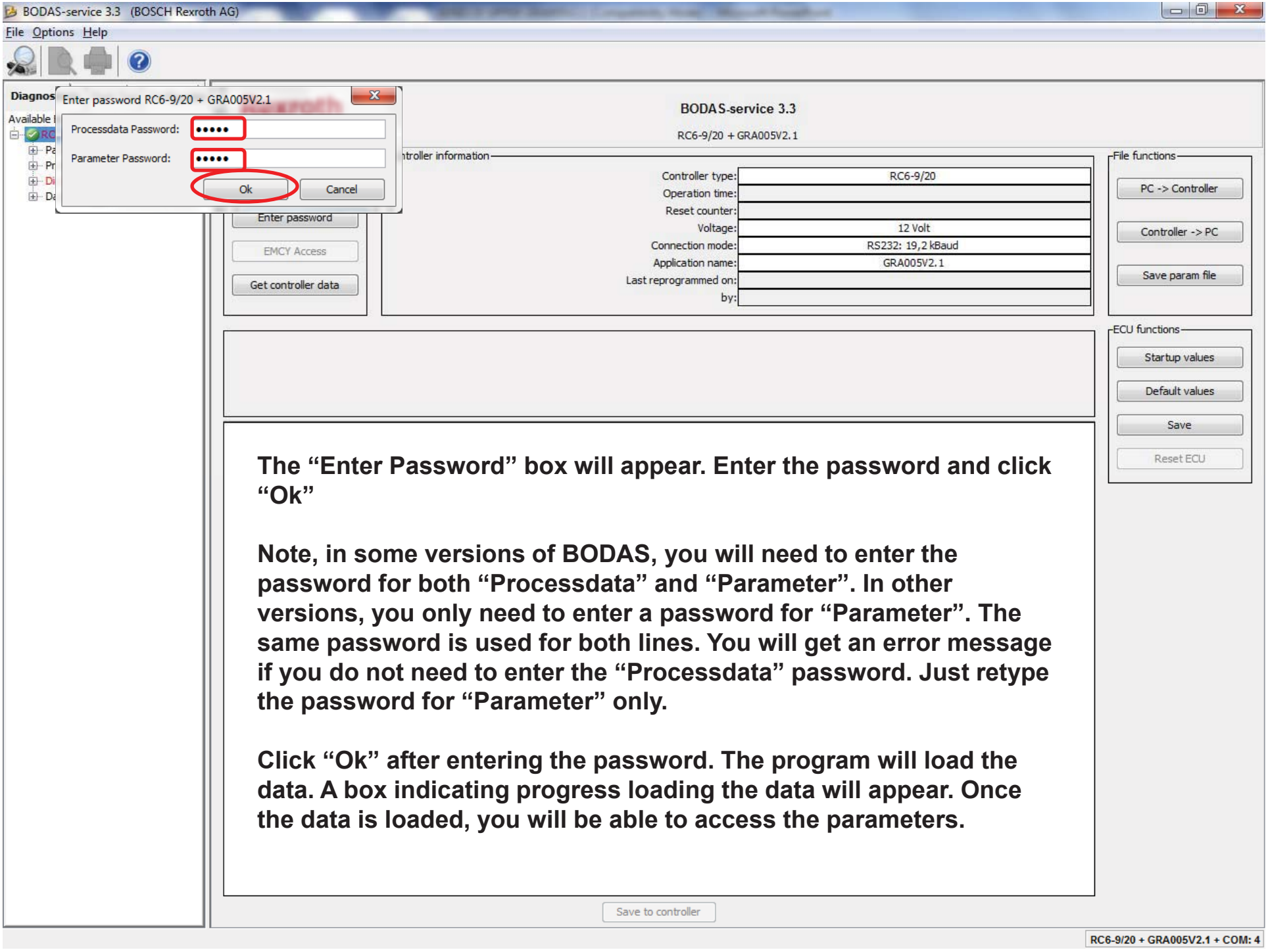
Idx	Name	Value	Description
3.1	hoist prox swt	0	1 = on
3.2	steer rt swt	0	1 = on
3.3	steer lf swt	0	1 = on
3.4	grade swt des	0	1 = on
3.5	grade swt act	0	1 = on
3.6	tool clean swt	0	1 = on
3.7	AC swt	0	1 = on
3.8	heater swt	0	1 = on
4.1	aux swt	0	1 = on
4.2	engine speed	0	rpm
4.3	hyd oil temp	33	F
4.4	heater temp	33	F
4.5	lh axis1 CAN	0	byte
4.6	lh axis2 CAN	0	byte
4.7	rh axis1 CAN	0	byte
4.8	rh axis2 CAN	0	byte
5.1	boom in	0	mA
5.2	boom out	0	mA
5.3	tool open	0	mA
5.4	tool close	0	mA
5.5	hoist up	0	mA
5.6	hoist down	0	mA
5.7	swing left	0	mA
5.8	swing right	0	mA
6.1	travel fwd	0	mA
6.2	travel rev	0	mA
6.3	cooling fan	1000	mA
6.4	heater	0	mA
6.5	pilot	0	1 = on
6.6	wait start lt	0	1 = on
6.7	check eng lt	0	1 = on
6.8	low air lt	0	1 = on
7.1	ret filter lt	0	1 = on
7.2	HF level lt	0	1 = on
7.3	low fuel lt	0	1 = on
7.4	swing bk rel	0	1 = on
7.5	flushing sol	0	1 = on
7.6	park brake lt	0	1 = on
7.7	travel lt	1	1 = on
7.8	warning lt	1	1 = on
8.1	ptc 56	0	
8.2	ptc 63	0	
8.3	lim lt	0	1 = on
8.4	hst post curve	0	

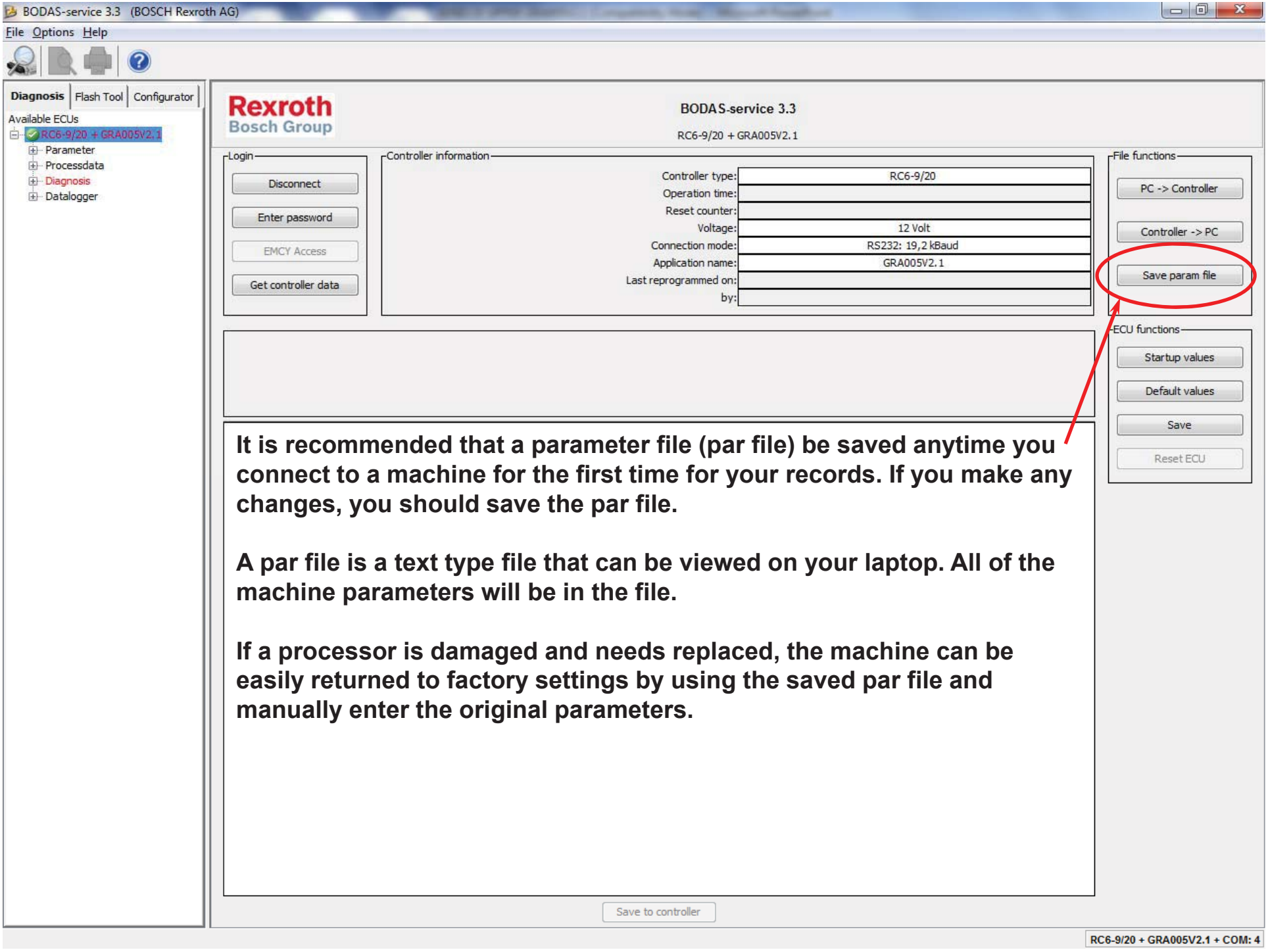

BODAS-service 3.3 (BOSCH Rexroth AG)
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BODAS-service 3.3
RC6-9/20 + GRA005V2.1
Diagnosis
Displays the current active, as well as the stored errors from the controller!
Diagnosis will be red if error codes are present. Click on the + sign to open the menu to read the error codes.
RC6-9/20 + GRA005V2.1 + COM: 4

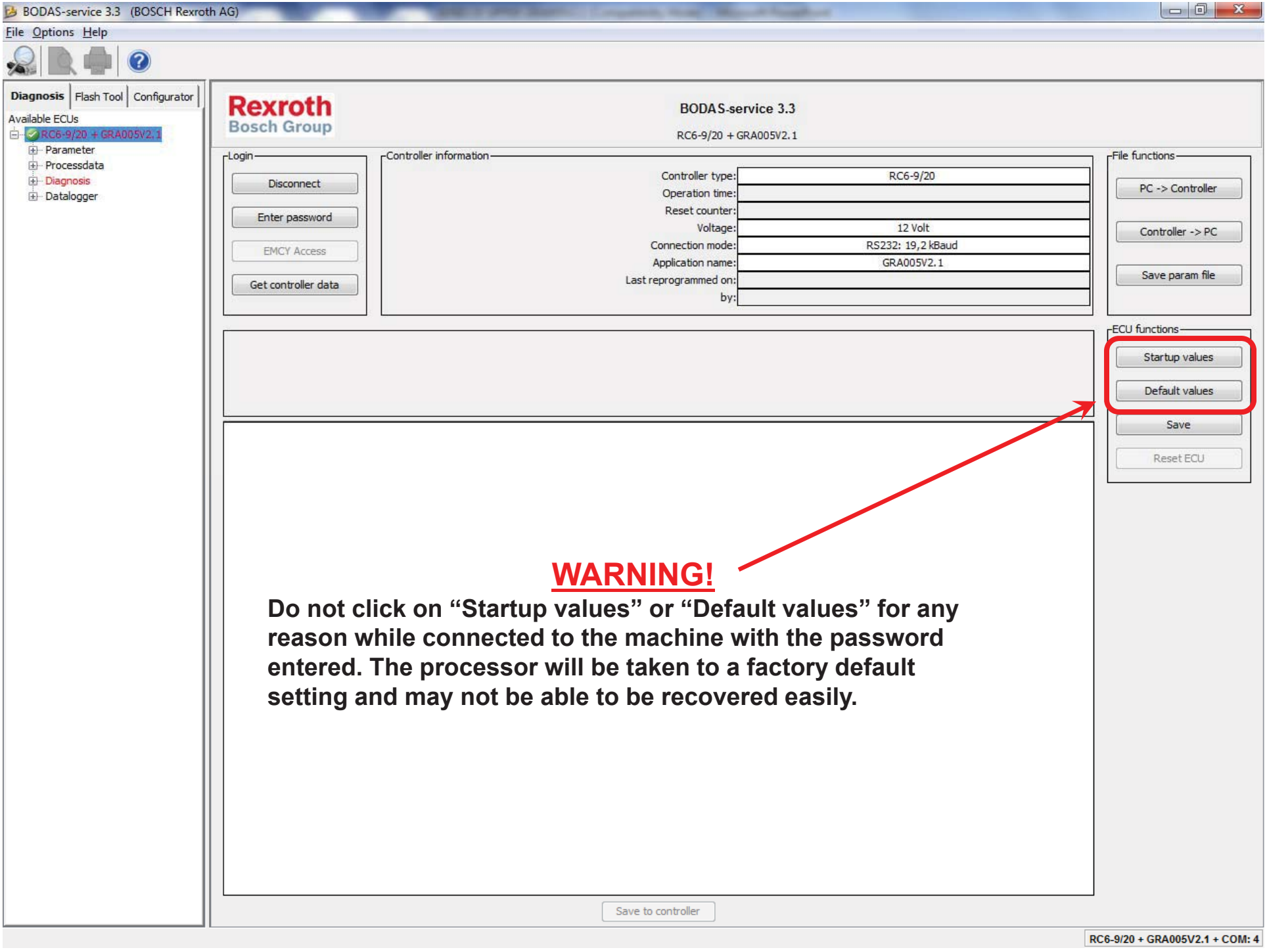

BODAS-service 3.3 (BOSCH Rexroth AG)
File Options Help
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Error messages (8/0)
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Record log data
Load log data
Overview of current active and saved error messages:
Active errors:
Index | Error Code | Occurrences | Timestamp | Error Message | Param
1 | 0x00F1 | 0 | not available | OS_CAN_BOX14_SEN | 0
2 | 0x0016 | 0 | not available | rh joystick CAN | 0
3 | 0x0015 | 0 | not available | lh joystick CAN | 0
4 | 0x0014 | 0 | not available | rc44a CAN | 0
5 | 0x0013 | 0 | not available | rce CAN | 0
6 | 0x0005 | 0 | not available | travel pot low | 0
7 | 0x0004 | 0 | not available | heater pot low | 0
8 | 0x0002 | 0 | not available | eng spd pot low | 0
Saved errors:
Index | Error Code | Occurrences | Timestamp | Error Message | Param
No errors available
In this example, 8 active error codes are shown. No inactive codes are shown. Inactive codes can be cleared.
When reading error codes, the error code is shown as an alphanumeric number and the message is shown as text. When consulting with GRADALL factory about errors, always use the Error Message
Some error codes are generated automatically due to starting the engine or switching from remote to travel mode. Example, every machine will have the “travel pot low” as an inactive code due to engine start. This is normal, you can clear the code, and it will return on the next engine start routine.
Delete saved errors
RC6-9/20 + GRA005V2.1 + COM: 4

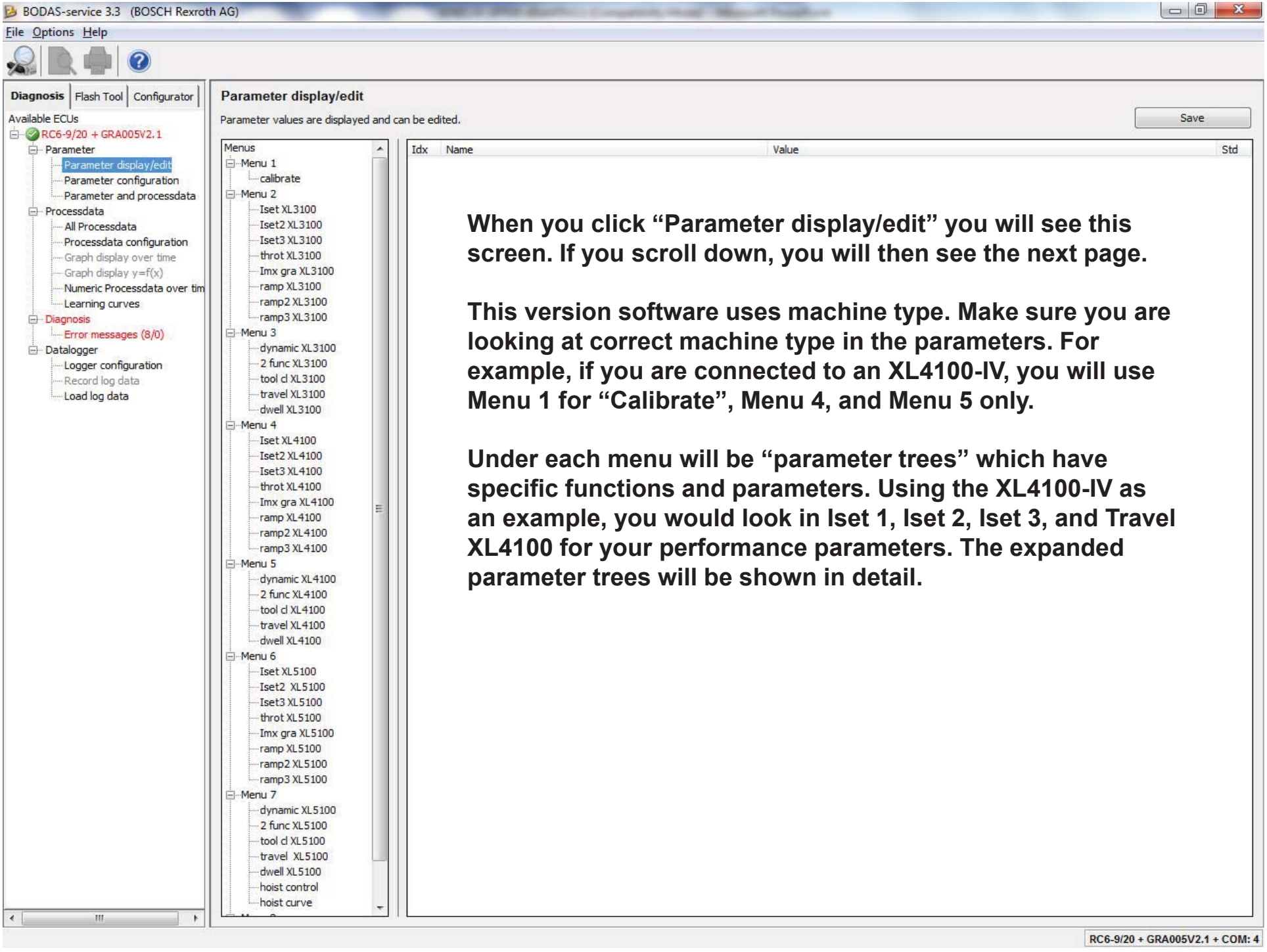

BODAS-service 3.3 (BOSCH Rexroth AG)
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Load log data
Rexroth
Bosch Group
BODAS-service 3.3
RC6-9/20 + GRA005V2.1
Parameter
Read and configure parameters stored in the controller!
Parameter display/edit - Displays all parameters, sorted by tree and group index for configuration!
Parameter configuration - Configure the parameter and processdata elements that should be used/displayed!
Parameter and processdata - Displays the selected processdata elements and parameters for editing!
Opening screen when you select “Parameter”
RC6-9/20 + GRA005V2.1 + COM: 4

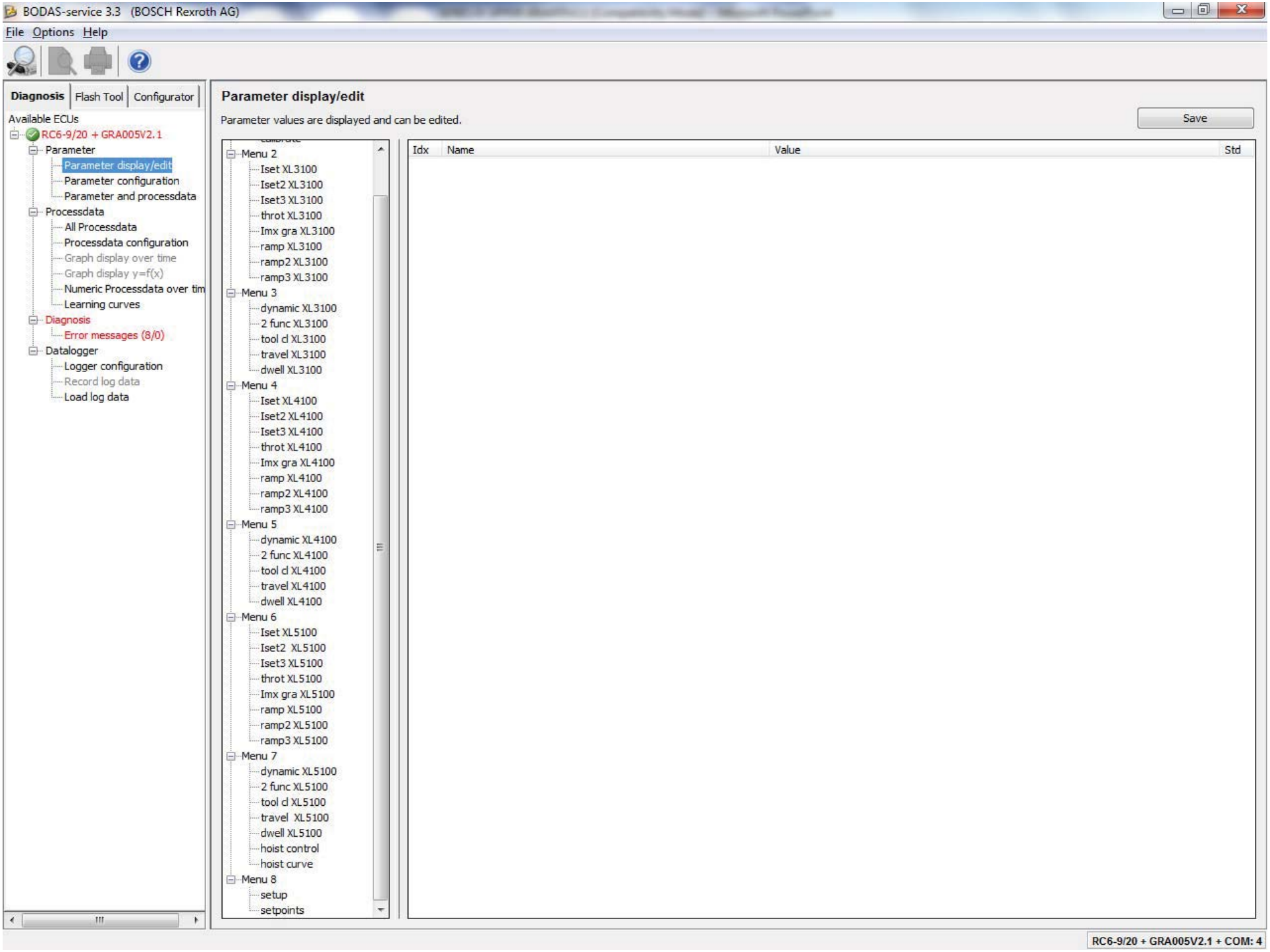

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BODAS-service 3.3
RC6-9/20 + GRA005V2.1
Login
Disconnect
Enter password
EMCY Access
Get controller data
Controller information
Controller type: RC6-9/20
Operation time:
Reset counter:
Voltage: 12 Volt
Connection mode: RS232: 19,2 kBaud
Application name: GRA005V2.1
Last reprogrammed on:
by:
File functions
PC -> Controller
Controller -> PC
Save param file
ECU functions
Startup values
Default values
Save
Reset ECU
For access to the parameters for adjustment, you will be required to enter a password. Consult with factory before changing any parameters and for the correct password.
The password is for GRADALL and GRADALL distributor use only. End user's of the machine should not have the password to make changes in machine set up.
To enter the password, click on "Enter Password".
Save to controller
RC6-9/20 + GRA005V2.1 + COM: 4

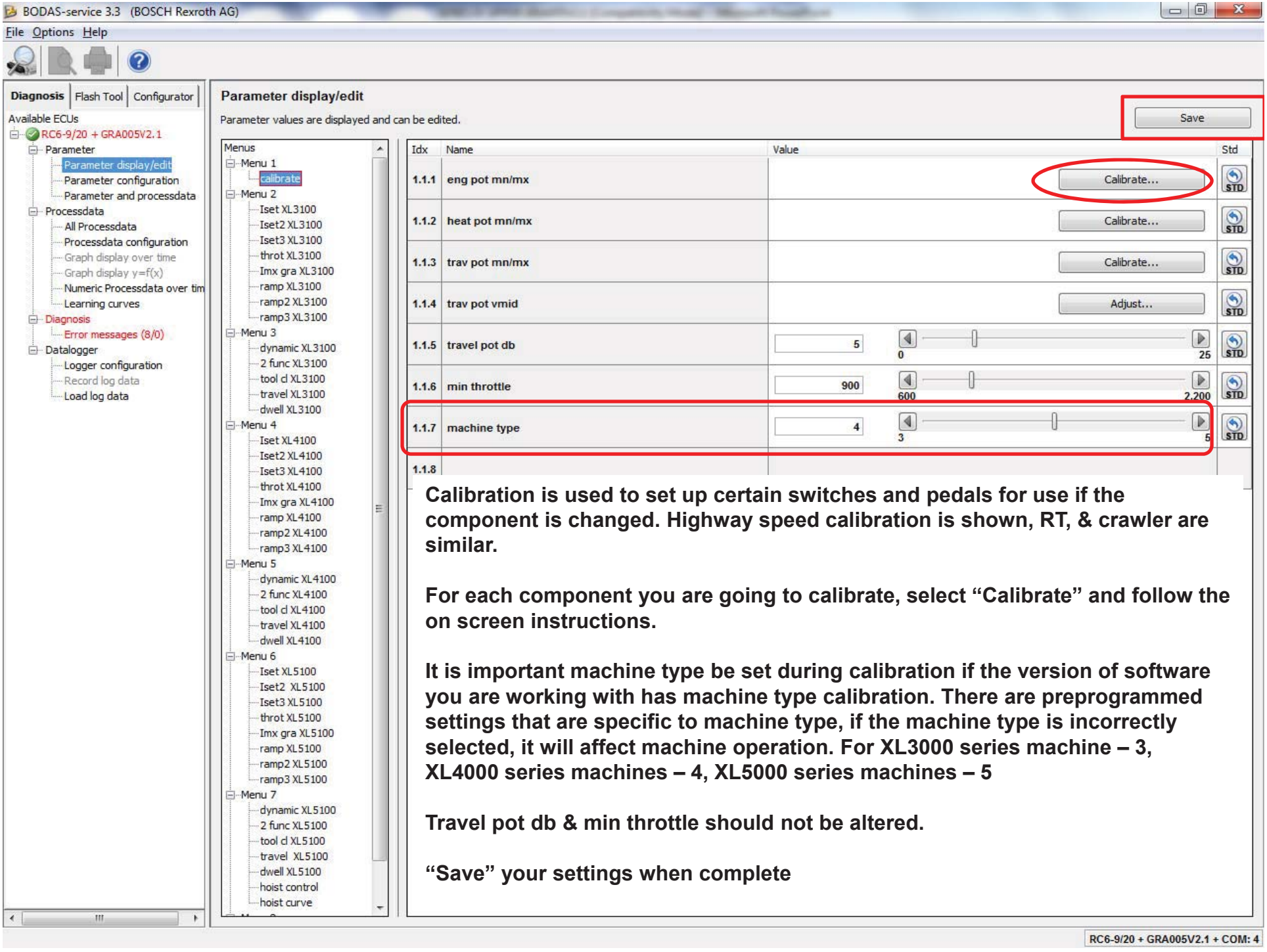

BODAS-service 3.3 (BOSCH Rexroth AG)
File Options Help
Enter password RC6-9/20 + GRA005V2.1
Processdata Password:
Parameter Password:
Ok
Cancel
BODAS-service 3.3
RC6-9/20 + GRA005V2.1
Enter password
EMCY Access
Get controller data
Controller type: RC6-9/20
Operation time:
Reset counter:
Voltage: 12 Volt
Connection mode: RS232: 19,2 kBaud
Application name: GRA005V2.1
Last reprogrammed on:
by:
File functions
PC -> Controller
Controller -> PC
Save param file
ECU functions
Startup values
Default values
Save
Reset ECU
The “Enter Password” box will appear. Enter the password and click “Ok”
Note, in some versions of BODAS, you will need to enter the password for both “Processdata” and “Parameter”. In other versions, you only need to enter a password for “Parameter”. The same password is used for both lines. You will get an error message if you do not need to enter the “Processdata” password. Just retype the password for “Parameter” only.
Click “Ok” after entering the password. The program will load the data. A box indicating progress loading the data will appear. Once the data is loaded, you will be able to access the parameters.
Save to controller
RC6-9/20 + GRA005V2.1 + COM: 4


BODAS-service 3.3 (BOSCH Rexroth AG)
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Login
Disconnect
Enter password
EMCY Access
Get controller data
Controller information
Controller type: RC6-9/20
Operation time:
Reset counter:
Voltage: 12 Volt
Connection mode: RS232: 19,2 kBaud
Application name: GRA005V2.1
Last reprogrammed on:
by:
File functions
PC -> Controller
Controller -> PC
Save param file
ECU functions
Startup values
Default values
Save
Reset ECU
It is recommended that a parameter file (par file) be saved anytime you connect to a machine for the first time for your records. If you make any changes, you should save the par file.
A par file is a text type file that can be viewed on your laptop. All of the machine parameters will be in the file.
If a processor is damaged and needs replaced, the machine can be easily returned to factory settings by using the saved par file and manually enter the original parameters.
Save to controller
RC6-9/20 + GRA005V2.1 + COM: 4


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RC6-9/20 + GRA005V2.1
Login
Disconnect
Enter password
EMCY Access
Get controller data
Controller information
Controller type: RC6-9/20
Operation time:
Reset counter:
Voltage: 12 Volt
Connection mode: RS232: 19,2 kBaud
Application name: GRA005V2.1
Last reprogrammed on:
by:
File functions
PC -> Controller
Controller -> PC
Save param file
ECU functions
Startup values
Default values
Save
Reset ECU
WARNING!
Do not click on “Startup values” or “Default values” for any reason while connected to the machine with the password entered. The processor will be taken to a factory default setting and may not be able to be recovered easily.
Save to controller
RC6-9/20 + GRA005V2.1 + COM: 4


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Save
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Iset3 XL3100
throt XL3100
Imx gra XL3100
ramp XL3100
ramp2 XL3100
ramp3 XL3100
Menu 3
dynamic XL3100
2 func XL3100
tool cl XL3100
travel XL3100
dwell XL3100
Menu 4
Iset XL4100
Iset2 XL4100
Iset3 XL4100
throt XL4100
Imx gra XL4100
ramp XL4100
ramp2 XL4100
ramp3 XL4100
Menu 5
dynamic XL4100
2 func XL4100
tool cl XL4100
travel XL4100
dwell XL4100
Menu 6
Iset XL5100
Iset2 XL5100
Iset3 XL5100
throt XL5100
Imx gra XL5100
ramp XL5100
ramp2 XL5100
ramp3 XL5100
Menu 7
dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
When you click “Parameter display/edit” you will see this screen. If you scroll down, you will then see the next page.
This version software uses machine type. Make sure you are looking at correct machine type in the parameters. For example, if you are connected to an XL4100-IV, you will use Menu 1 for “Calibrate”, Menu 4, and Menu 5 only.
Under each menu will be “parameter trees” which have specific functions and parameters. Using the XL4100-IV as an example, you would look in Iset 1, Iset 2, Iset 3, and Travel XL4100 for your performance parameters. The expanded parameter trees will be shown in detail.
RC6-9/20 + GRA005V2.1 + COM: 4


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Save
Menu 2
Iset XL3100
Iset2 XL3100
Iset3 XL3100
throt XL3100
Imx gra XL3100
ramp XL3100
ramp2 XL3100
ramp3 XL3100
Menu 3
dynamic XL3100
2 func XL3100
tool cl XL3100
travel XL3100
dwell XL3100
Menu 4
Iset XL4100
Iset2 XL4100
Iset3 XL4100
throt XL4100
Imx gra XL4100
ramp XL4100
ramp2 XL4100
ramp3 XL4100
Menu 5
dynamic XL4100
2 func XL4100
tool cl XL4100
travel XL4100
dwell XL4100
Menu 6
Iset XL5100
Iset2 XL5100
Iset3 XL5100
throt XL5100
Imx gra XL5100
ramp XL5100
ramp2 XL5100
ramp3 XL5100
Menu 7
dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Menu 8
setup
setpoints
Idx
Name
Value
Std
RC6-9/20 + GRA005V2.1 + COM: 4



Calibration is used to set up certain switches and pedals for use if the component is changed. Highway speed calibration is shown, RT, & crawler are similar.

For each component you are going to calibrate, select “Calibrate” and follow the on screen instructions.

It is important machine type be set during calibration if the version of software you are working with has machine type calibration. There are preprogrammed settings that are specific to machine type, if the machine type is incorrectly selected, it will affect machine operation. For XL3000 series machine – 3, XL4000 series machines – 4, XL5000 series machines – 5

Travel pot db & min throttle should not be altered.

“Save” your settings when complete

Parameter Settings

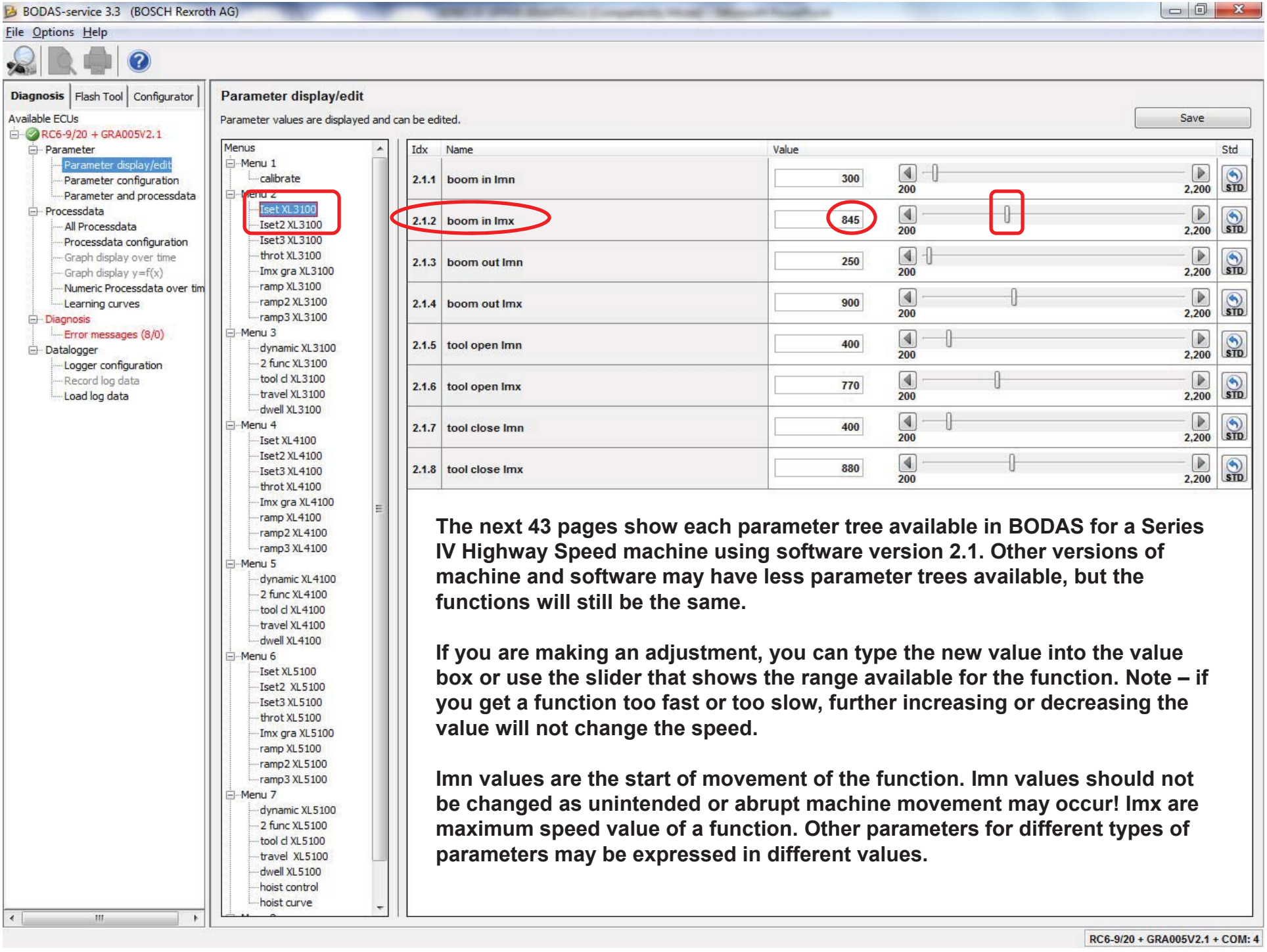
The next several screens will show all parameter settings available within BODAS. The parameters are settings that determine machine performance and response to control inputs. Note the examples shown are for a specific software version and machine type. Your screens may be arranged differently due to machine type and software version installed.

Parameters should not be reset without consulting *GRADALL.* Performance parameters are set at *GRADALL* after assembly using the "Final Test Sheet" for performance specifications. Other parameters are set within the software and should not be adjusted.

Typically only the Imx setting (Example: Boom In Imx) for function speeds will be adjusted. Do not adjust any other parameter unless instructed by a *GRADALL* representative.

You should have a current copy of the final test sheet for the machine type to verify function performance meets factory specifications before and after adjustment. Do not adjust any function speed to be faster than factory specification as hydraulic system performance problems may occur and damage to hydraulic components may occur

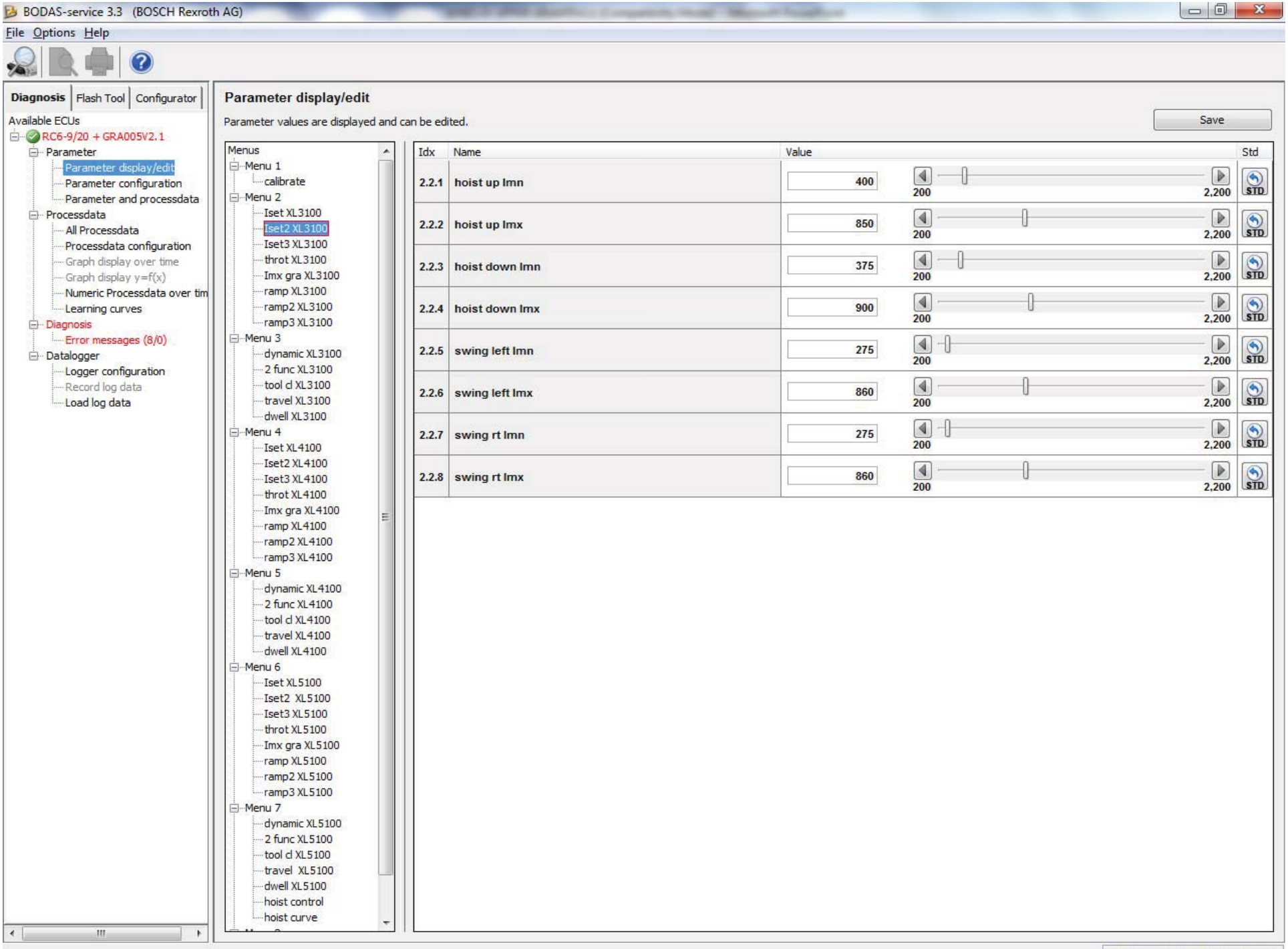
Changing parameters for function speed to suit operator preference is not supported by *GRADALL.*

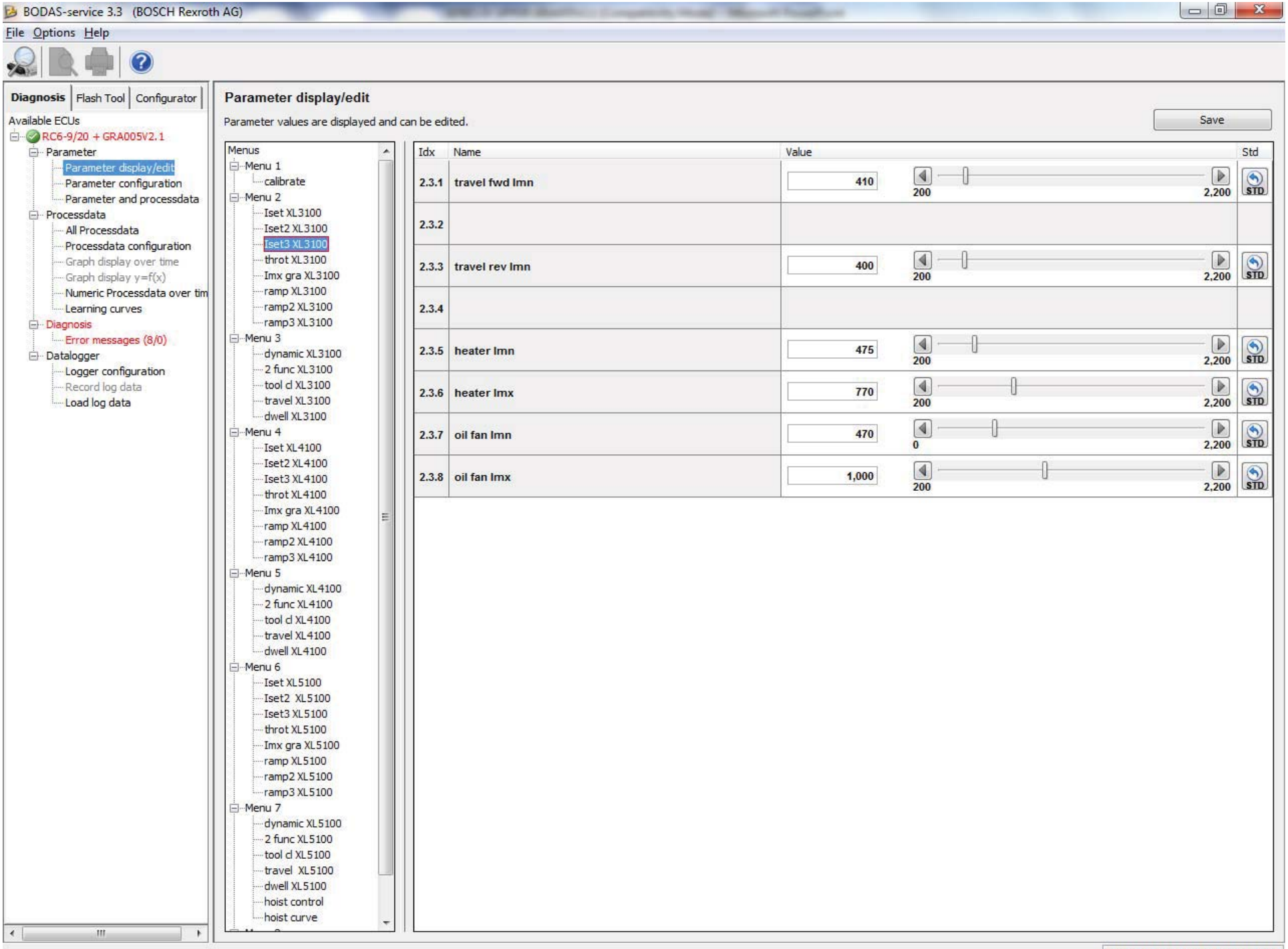


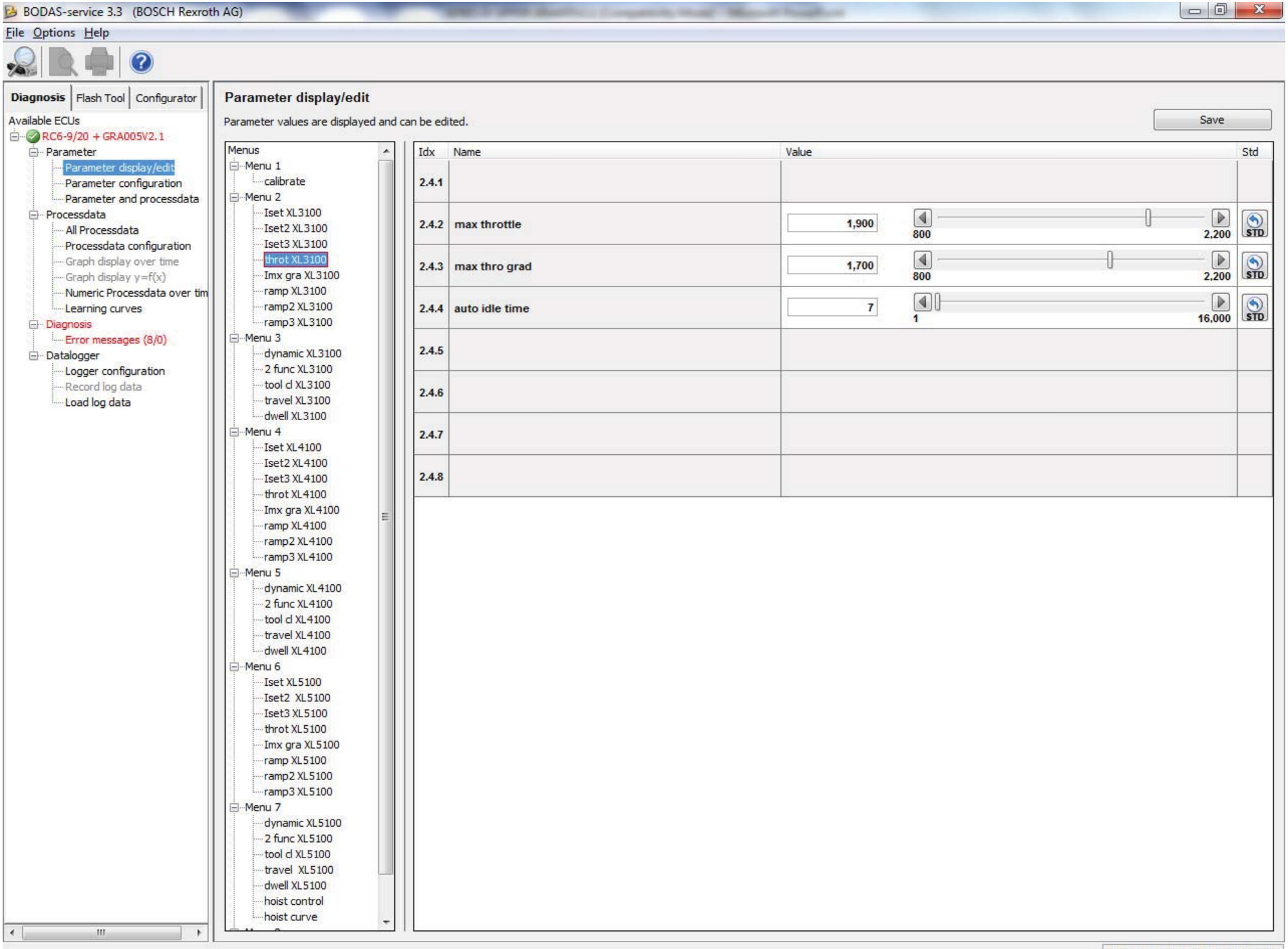
The next 43 pages show each parameter tree available in BODAS for a Series IV Highway Speed machine using software version 2.1. Other versions of machine and software may have less parameter trees available, but the functions will still be the same.

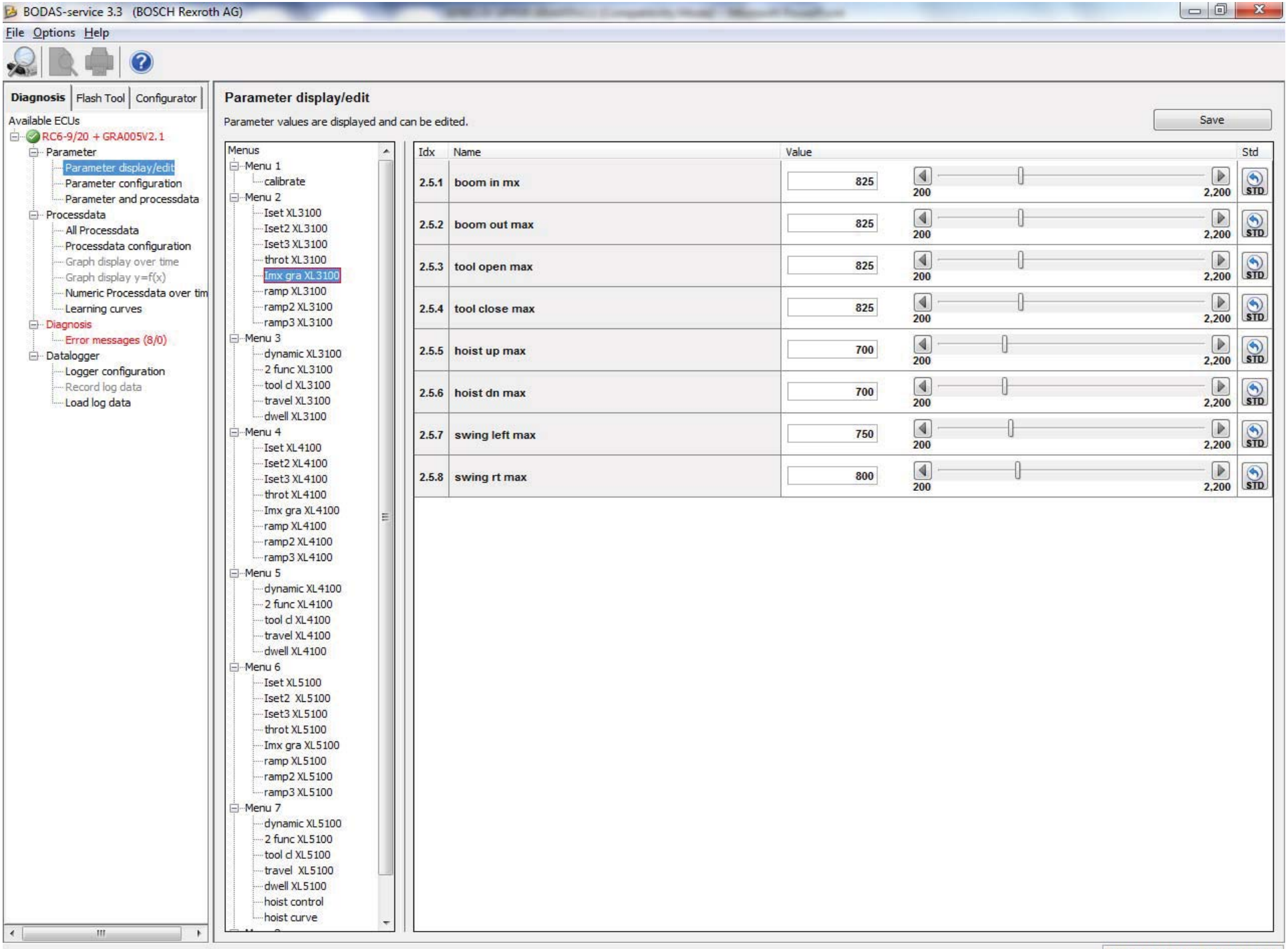
If you are making an adjustment, you can type the new value into the value box or use the slider that shows the range available for the function. Note – if you get a function too fast or too slow, further increasing or decreasing the value will not change the speed.

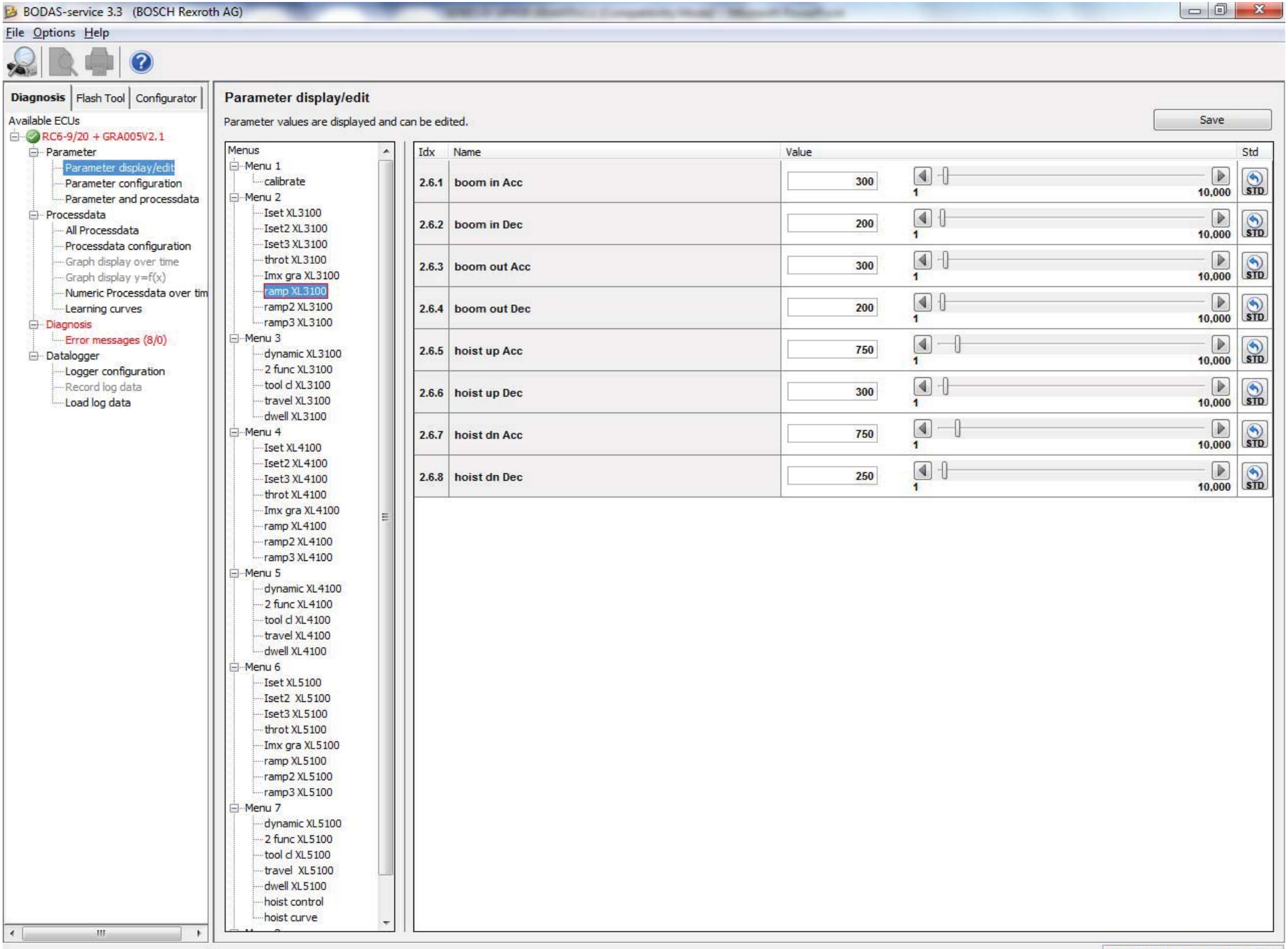
Imn values are the start of movement of the function. Imn values should not be changed as unintended or abrupt machine movement may occur! Imx are maximum speed value of a function. Other parameters for different types of parameters may be expressed in different values.

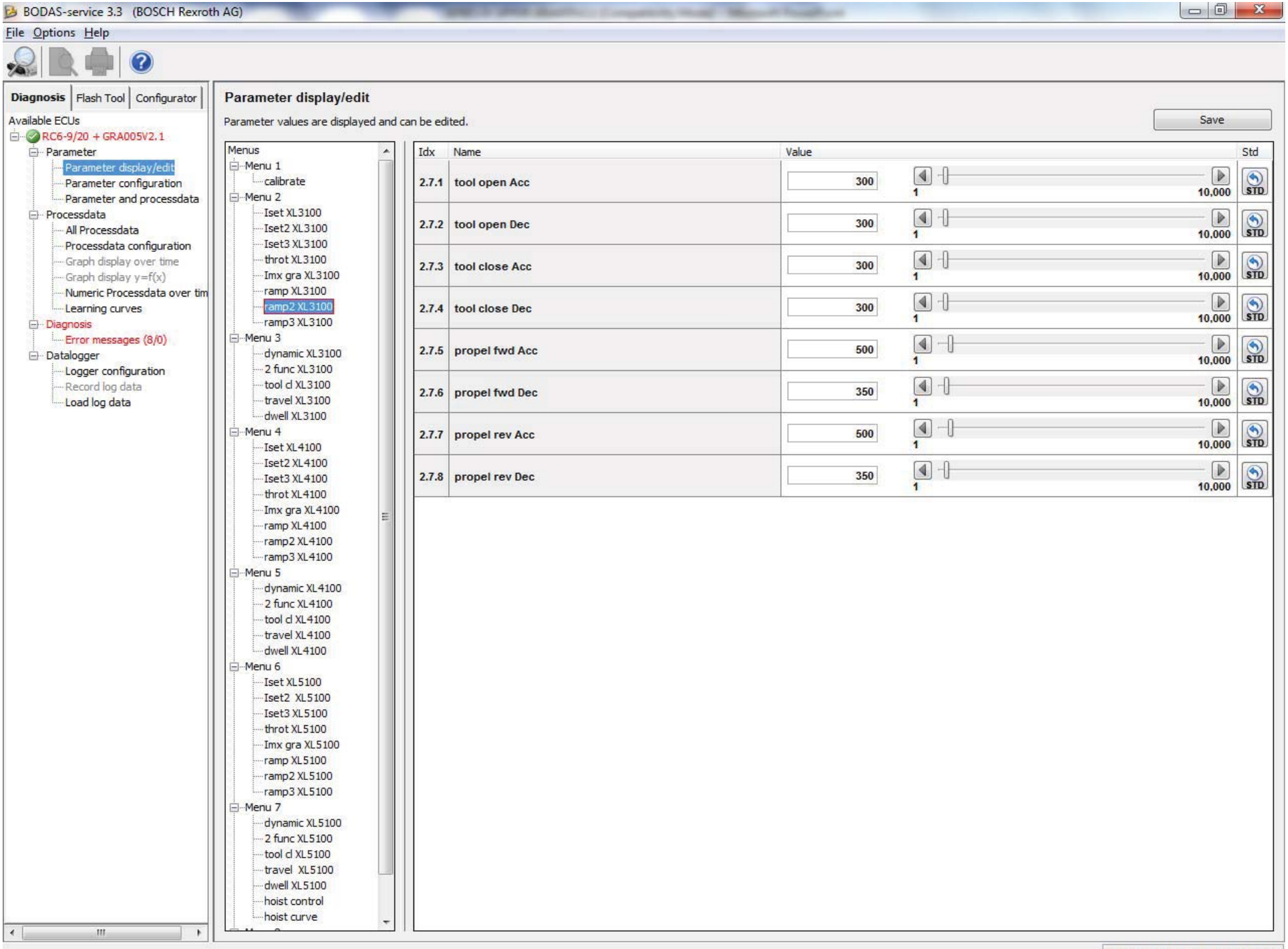

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Iset3 XL3100
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Imx gra XL3100
ramp XL3100
ramp2 XL3100
ramp3 XL3100
Menu 3
dynamic XL3100
2 func XL3100
tool cl XL3100
travel XL3100
dwell XL3100
Menu 4
Iset XL4100
Iset2 XL4100
Iset3 XL4100
throt XL4100
Imx gra XL4100
ramp XL4100
ramp2 XL4100
ramp3 XL4100
Menu 5
dynamic XL4100
2 func XL4100
tool cl XL4100
travel XL4100
dwell XL4100
Menu 6
Iset XL5100
Iset2 XL5100
Iset3 XL5100
throt XL5100
Imx gra XL5100
ramp XL5100
ramp2 XL5100
ramp3 XL5100
Menu 7
dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
2.2.1 hoist up lmn 400 200 2,200 STD
2.2.2 hoist up lmx 850 200 2,200 STD
2.2.3 hoist down lmn 375 200 2,200 STD
2.2.4 hoist down lmx 900 200 2,200 STD
2.2.5 swing left lmn 275 200 2,200 STD
2.2.6 swing left lmx 860 200 2,200 STD
2.2.7 swing rt lmn 275 200 2,200 STD
2.2.8 swing rt lmx 860 200 2,200 STD
RC6-9/20 + GRA005V2.1 + COM: 4

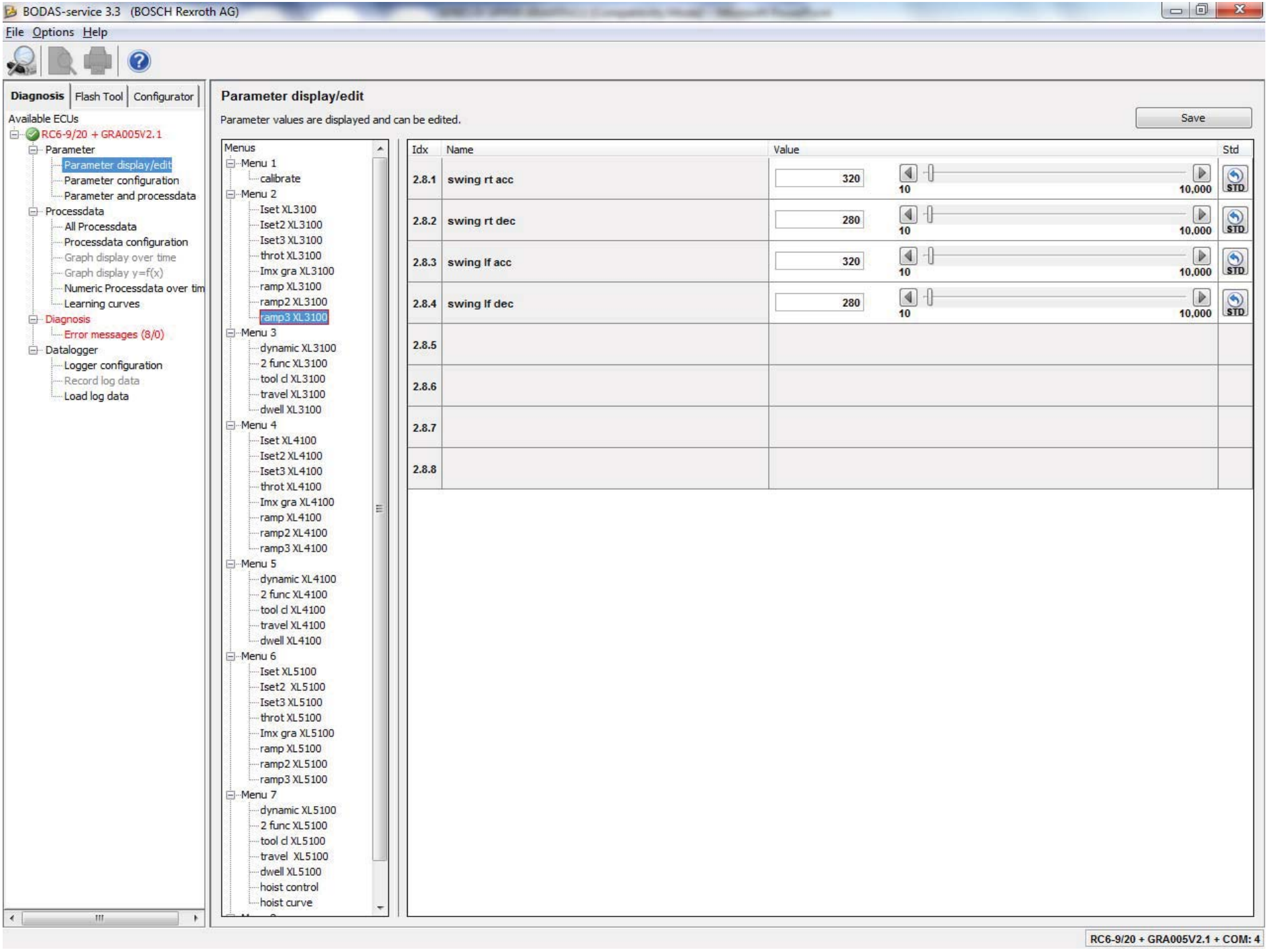

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Iset3 XL3100
throt XL3100
Imx gra XL3100
ramp XL3100
ramp2 XL3100
ramp3 XL3100
Menu 3
dynamic XL3100
2 func XL3100
tool cl XL3100
travel XL3100
dwell XL3100
Menu 4
Iset XL4100
Iset2 XL4100
Iset3 XL4100
throt XL4100
Imx gra XL4100
ramp XL4100
ramp2 XL4100
ramp3 XL4100
Menu 5
dynamic XL4100
2 func XL4100
tool cl XL4100
travel XL4100
dwell XL4100
Menu 6
Iset XL5100
Iset2 XL5100
Iset3 XL5100
throt XL5100
Imx gra XL5100
ramp XL5100
ramp2 XL5100
ramp3 XL5100
Menu 7
dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
2.3.1 travel fwd lmn 410 200 2,200 STD
2.3.2
2.3.3 travel rev lmn 400 200 2,200 STD
2.3.4
2.3.5 heater lmn 475 200 2,200 STD
2.3.6 heater lmx 770 200 2,200 STD
2.3.7 oil fan lmn 470 0 2,200 STD
2.3.8 oil fan lmx 1,000 200 2,200 STD
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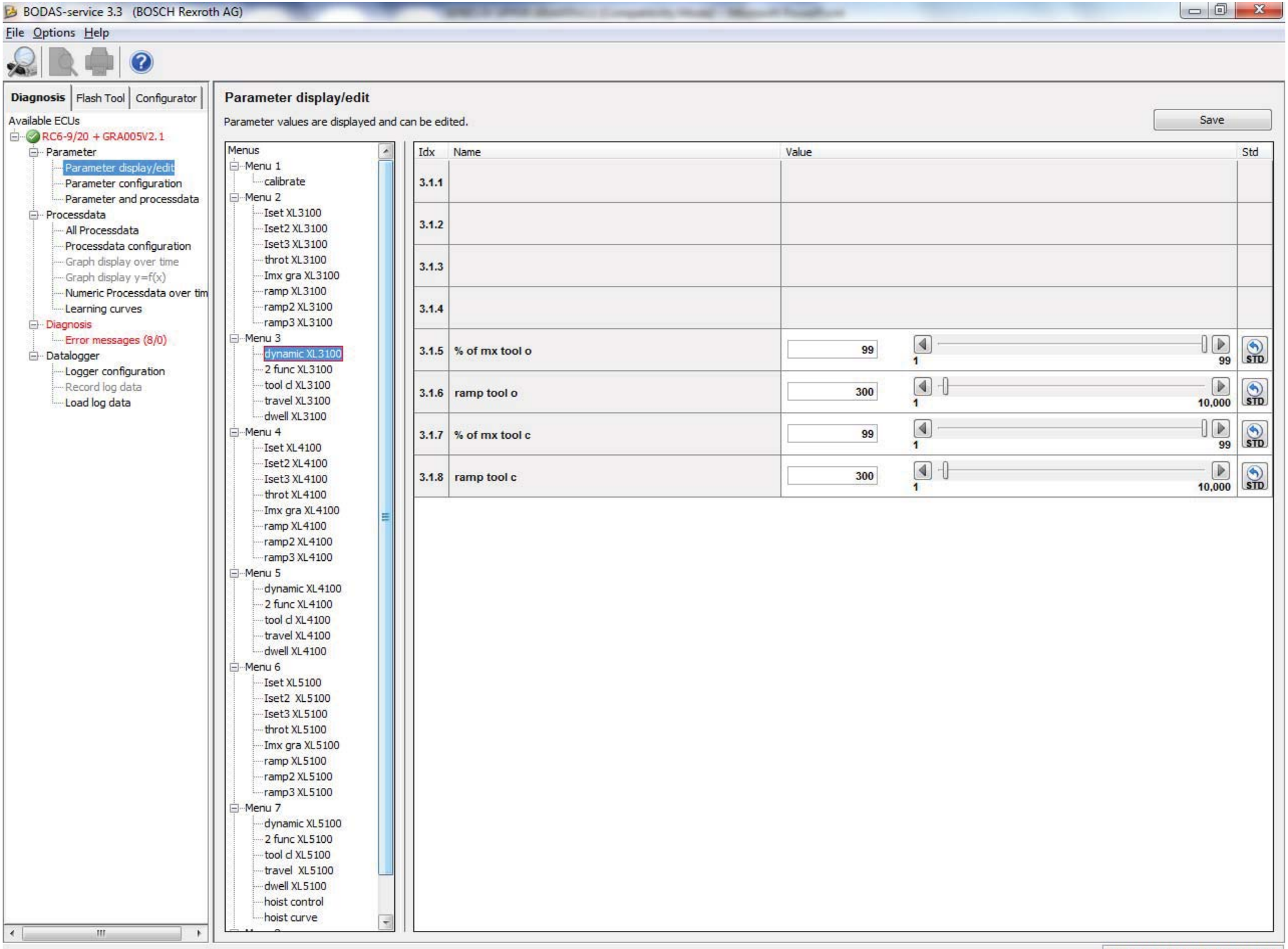

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ramp XL3100
ramp2 XL3100
ramp3 XL3100
Menu 3
dynamic XL3100
2 func XL3100
tool cl XL3100
travel XL3100
dwell XL3100
Menu 4
Iset XL4100
Iset2 XL4100
Iset3 XL4100
throt XL4100
Imx gra XL4100
ramp XL4100
ramp2 XL4100
ramp3 XL4100
Menu 5
dynamic XL4100
2 func XL4100
tool cl XL4100
travel XL4100
dwell XL4100
Menu 6
Iset XL5100
Iset2 XL5100
Iset3 XL5100
throt XL5100
Imx gra XL5100
ramp XL5100
ramp2 XL5100
ramp3 XL5100
Menu 7
dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
2.4.1
2.4.2
max throttle
1,900
800
2,200
STD
2.4.3
max thro grad
1,700
800
2,200
STD
2.4.4
auto idle time
7
1
16,000
STD
2.4.5
2.4.6
2.4.7
2.4.8
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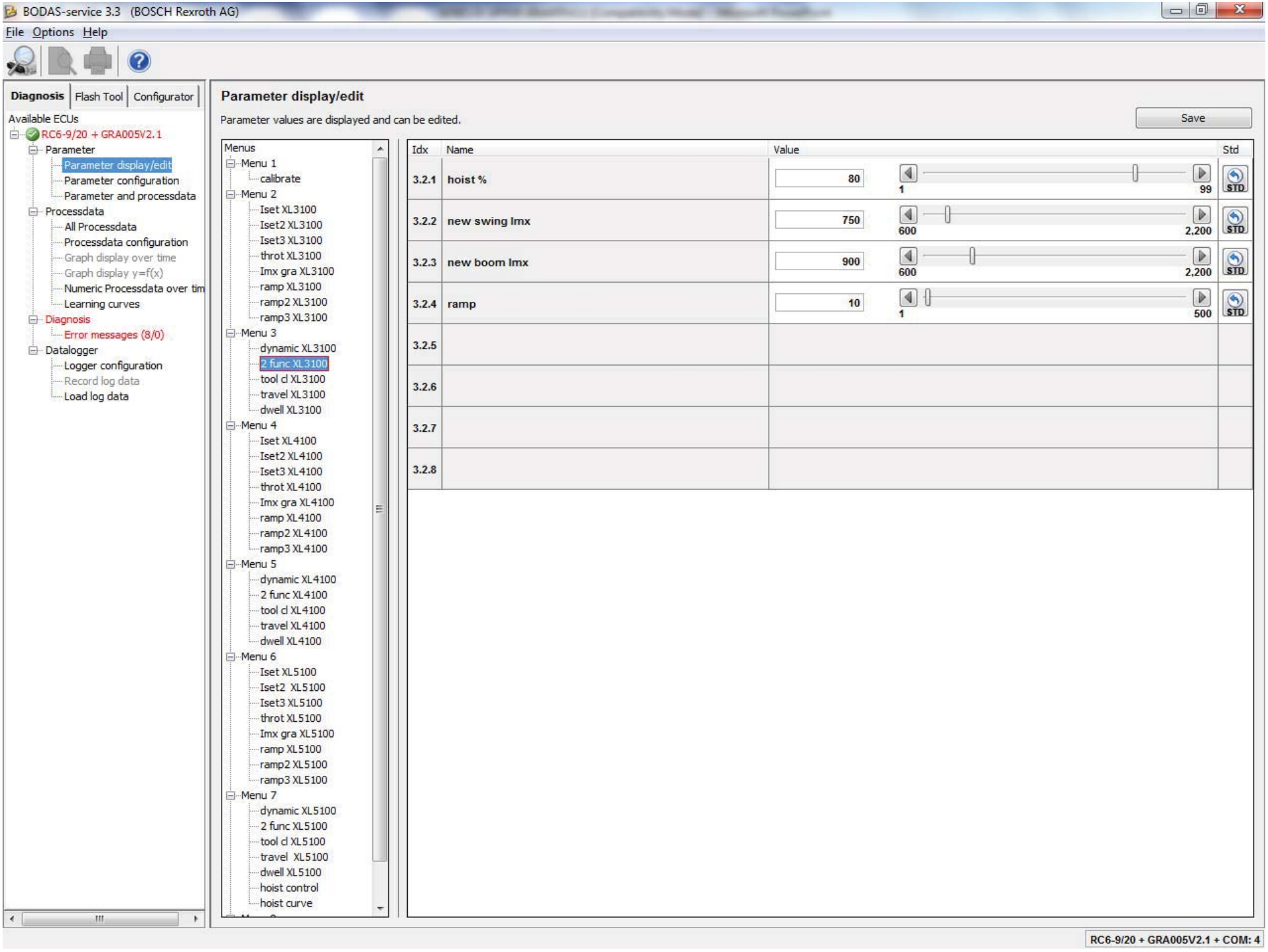

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ramp2 XL3100
ramp3 XL3100
Menu 3
dynamic XL3100
2 func XL3100
tool cl XL3100
travel XL3100
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Menu 4
Iset XL4100
Iset2 XL4100
Iset3 XL4100
throt XL4100
Imx gra XL4100
ramp XL4100
ramp2 XL4100
ramp3 XL4100
Menu 5
dynamic XL4100
2 func XL4100
tool cl XL4100
travel XL4100
dwell XL4100
Menu 6
Iset XL5100
Iset2 XL5100
Iset3 XL5100
throt XL5100
Imx gra XL5100
ramp XL5100
ramp2 XL5100
ramp3 XL5100
Menu 7
dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
2.5.1 boom in mx 825 200 2,200 STD
2.5.2 boom out max 825 200 2,200 STD
2.5.3 tool open max 825 200 2,200 STD
2.5.4 tool close max 825 200 2,200 STD
2.5.5 hoist up max 700 200 2,200 STD
2.5.6 hoist dn max 700 200 2,200 STD
2.5.7 swing left max 750 200 2,200 STD
2.5.8 swing rt max 800 200 2,200 STD
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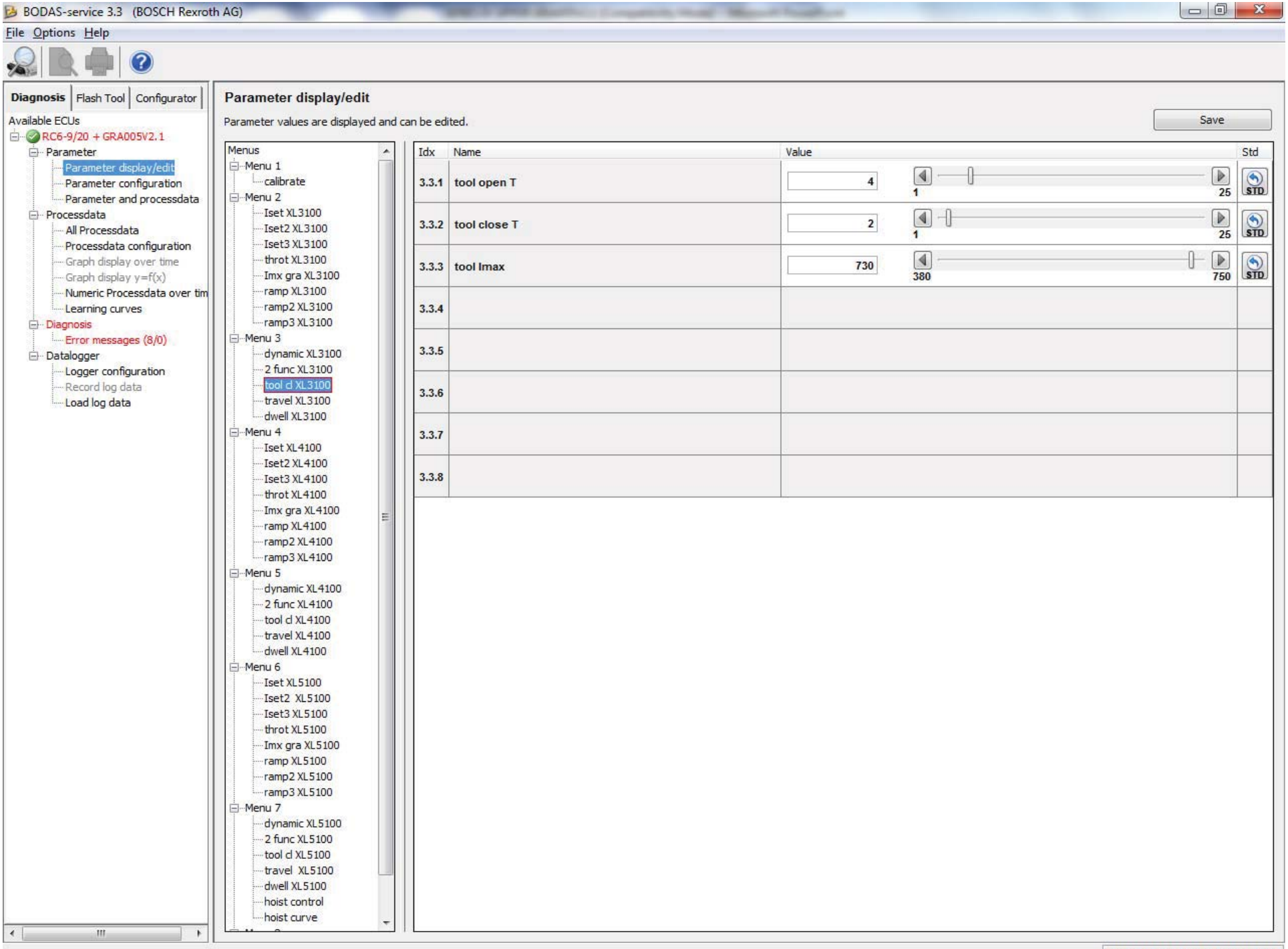

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dynamic XL3100
2 func XL3100
tool cl XL3100
travel XL3100
dwell XL3100
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Iset XL4100
Iset2 XL4100
Iset3 XL4100
throt XL4100
Imx gra XL4100
ramp XL4100
ramp2 XL4100
ramp3 XL4100
Menu 5
dynamic XL4100
2 func XL4100
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travel XL4100
dwell XL4100
Menu 6
Iset XL5100
Iset2 XL5100
Iset3 XL5100
throt XL5100
Imx gra XL5100
ramp XL5100
ramp2 XL5100
ramp3 XL5100
Menu 7
dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
2.6.1 boom in Acc 300 1 10,000 STD
2.6.2 boom in Dec 200 1 10,000 STD
2.6.3 boom out Acc 300 1 10,000 STD
2.6.4 boom out Dec 200 1 10,000 STD
2.6.5 hoist up Acc 750 1 10,000 STD
2.6.6 hoist up Dec 300 1 10,000 STD
2.6.7 hoist dn Acc 750 1 10,000 STD
2.6.8 hoist dn Dec 250 1 10,000 STD
RC6-9/20 + GRA005V2.1 + COM: 4

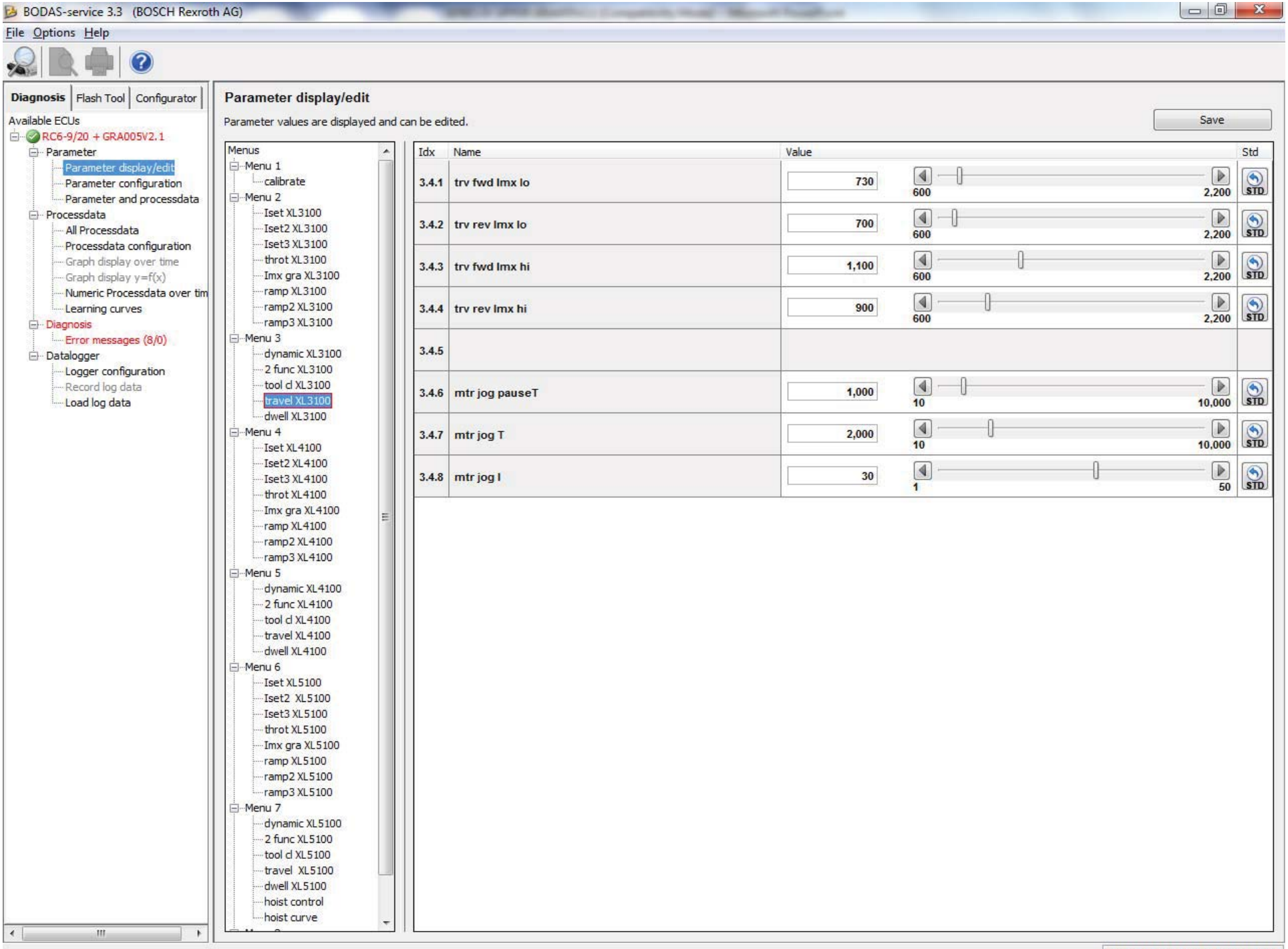

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Iset2 XL3100
Iset3 XL3100
throt XL3100
Imx gra XL3100
ramp XL3100
ramp2 XL3100
ramp3 XL3100
Menu 3
dynamic XL3100
2 func XL3100
tool cl XL3100
travel XL3100
dwell XL3100
Menu 4
Iset XL4100
Iset2 XL4100
Iset3 XL4100
throt XL4100
Imx gra XL4100
ramp XL4100
ramp2 XL4100
ramp3 XL4100
Menu 5
dynamic XL4100
2 func XL4100
tool cl XL4100
travel XL4100
dwell XL4100
Menu 6
Iset XL5100
Iset2 XL5100
Iset3 XL5100
throt XL5100
Imx gra XL5100
ramp XL5100
ramp2 XL5100
ramp3 XL5100
Menu 7
dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
2.7.1 tool open Acc 300 1 10,000 STD
2.7.2 tool open Dec 300 1 10,000 STD
2.7.3 tool close Acc 300 1 10,000 STD
2.7.4 tool close Dec 300 1 10,000 STD
2.7.5 propel fwd Acc 500 1 10,000 STD
2.7.6 propel fwd Dec 350 1 10,000 STD
2.7.7 propel rev Acc 500 1 10,000 STD
2.7.8 propel rev Dec 350 1 10,000 STD
RC6-9/20 + GRA005V2.1 + COM: 4

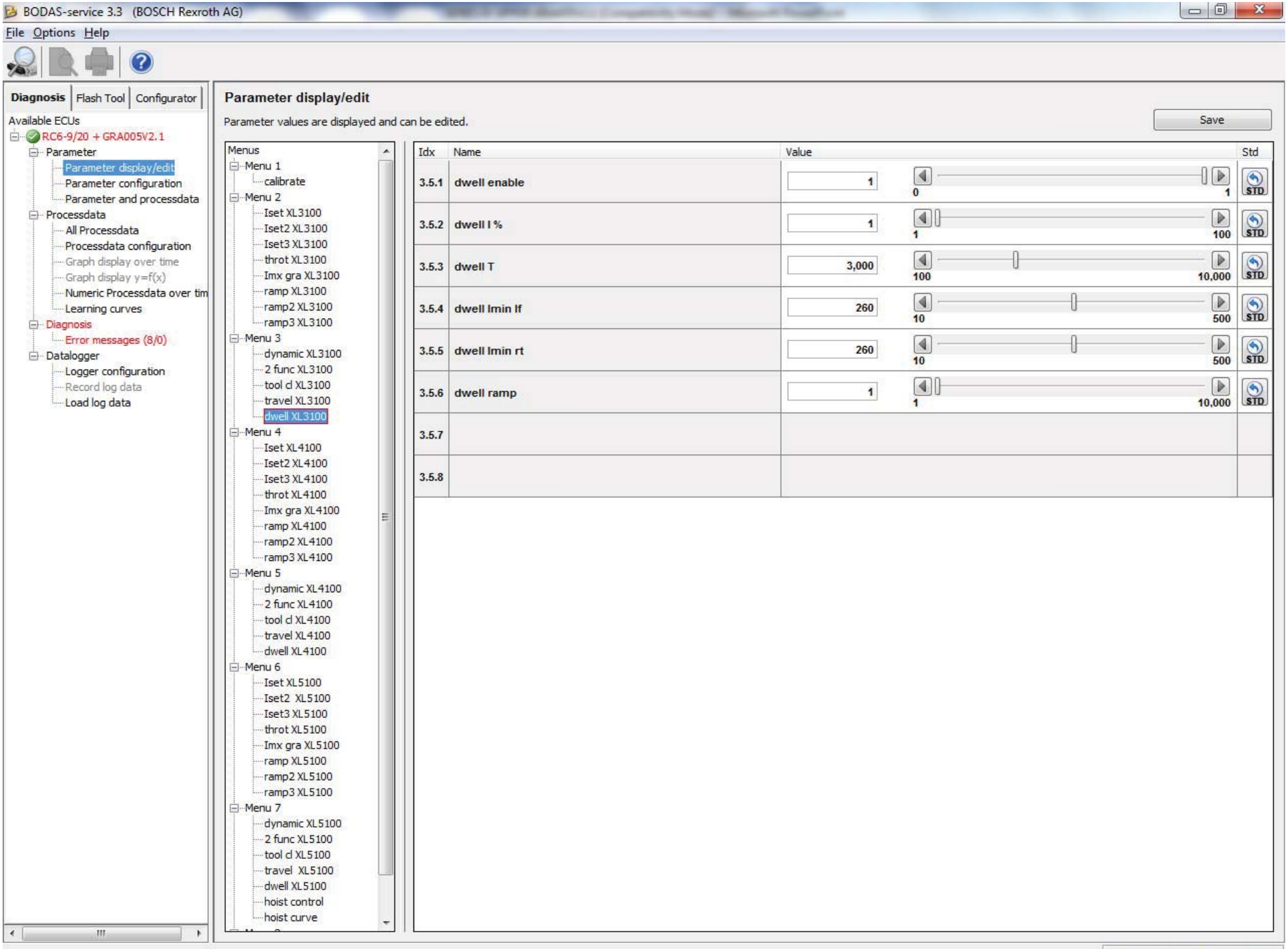

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Iset3 XL3100
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Imx gra XL3100
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2 func XL5100
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Std
2.8.1 swing rt acc 320 10 10,000 STD
2.8.2 swing rt dec 280 10 10,000 STD
2.8.3 swing lf acc 320 10 10,000 STD
2.8.4 swing lf dec 280 10 10,000 STD
2.8.5
2.8.6
2.8.7
2.8.8
RC6-9/20 + GRA005V2.1 + COM: 4

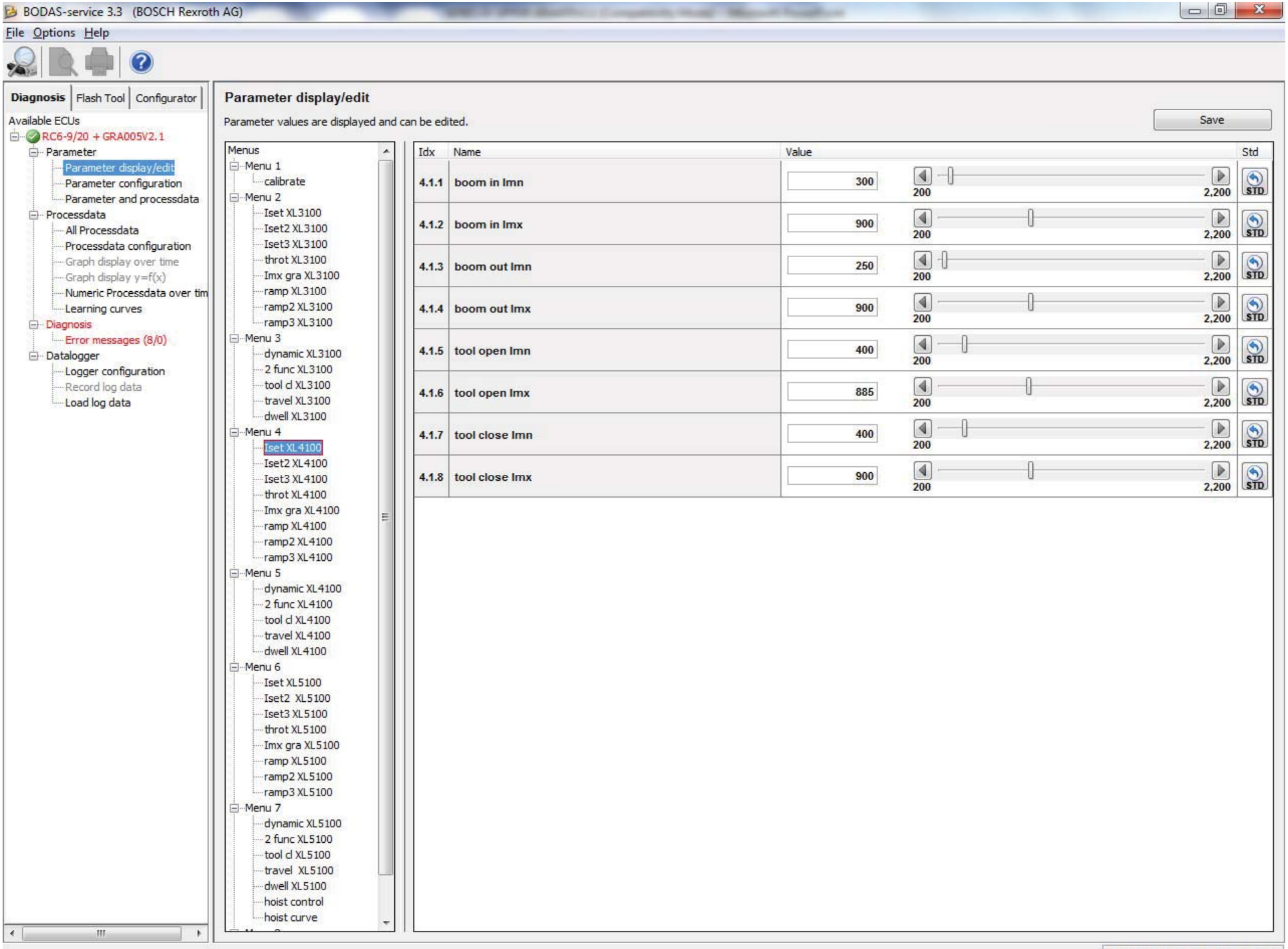

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3.1.2
3.1.3
3.1.4
3.1.5
% of mx tool o
99
1
99
STD
3.1.6
ramp tool o
300
1
10,000
STD
3.1.7
% of mx tool c
99
1
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ramp tool c
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STD
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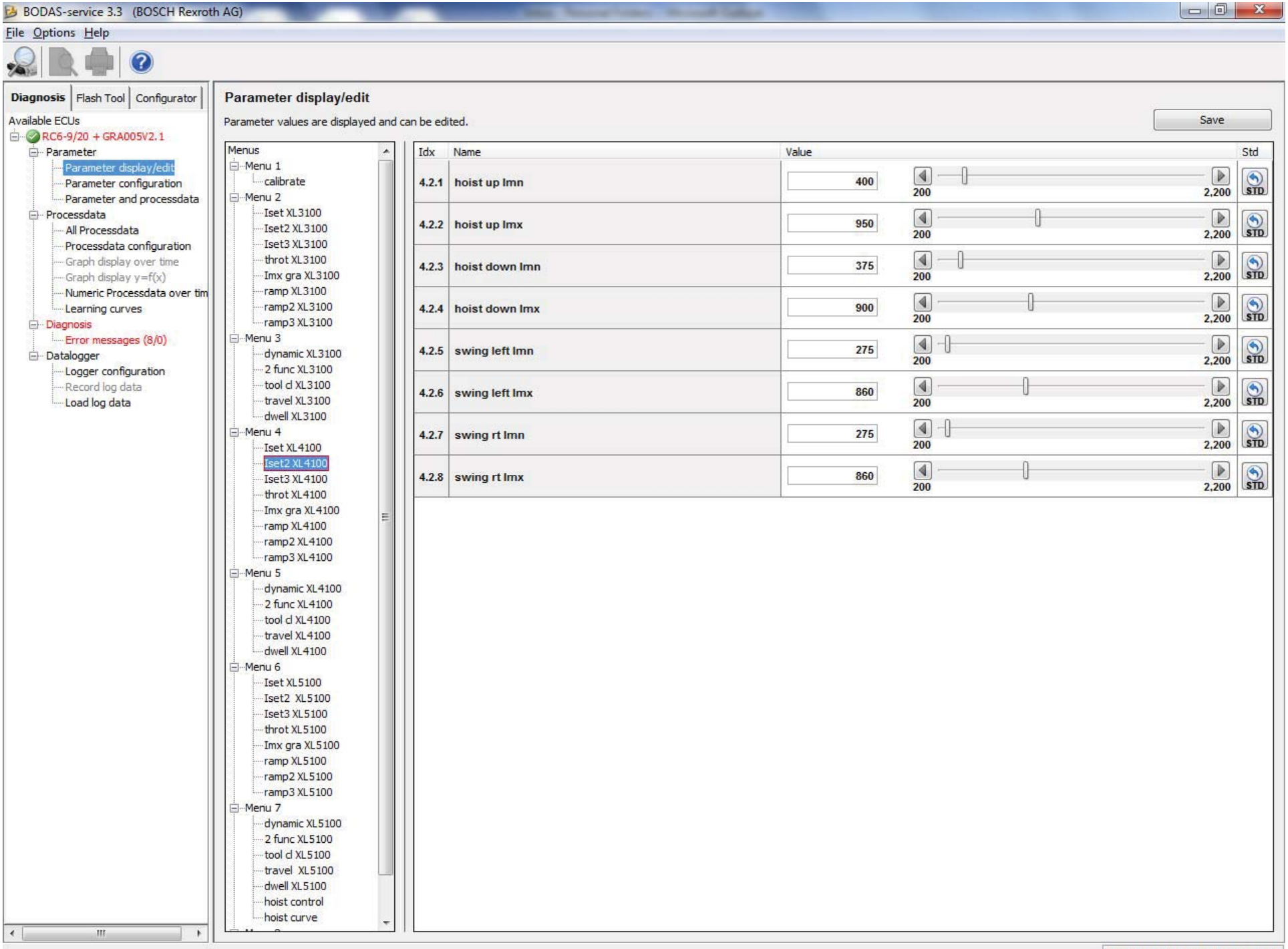

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2 func XL5100
tool cl XL5100
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dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
3.2.1 hoist % 80 1 99 STD
3.2.2 new swing Imx 750 600 2,200 STD
3.2.3 new boom Imx 900 600 2,200 STD
3.2.4 ramp 10 1 500 STD
3.2.5
3.2.6
3.2.7
3.2.8
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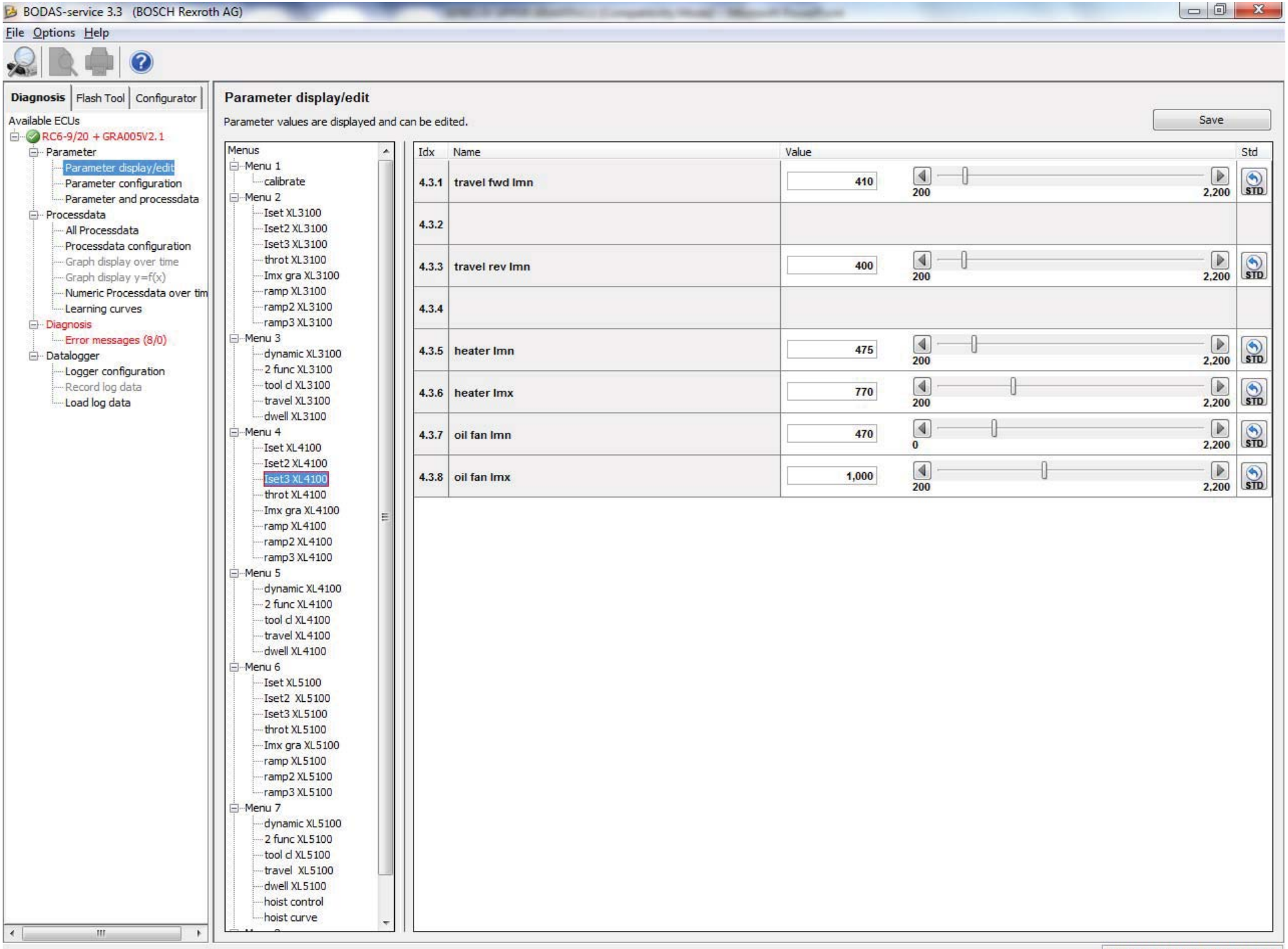

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2 func XL5100
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travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
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Std
3.3.1 tool open T 4 1 25 STD
3.3.2 tool close T 2 1 25 STD
3.3.3 tool Imax 730 380 750 STD
3.3.4
3.3.5
3.3.6
3.3.7
3.3.8
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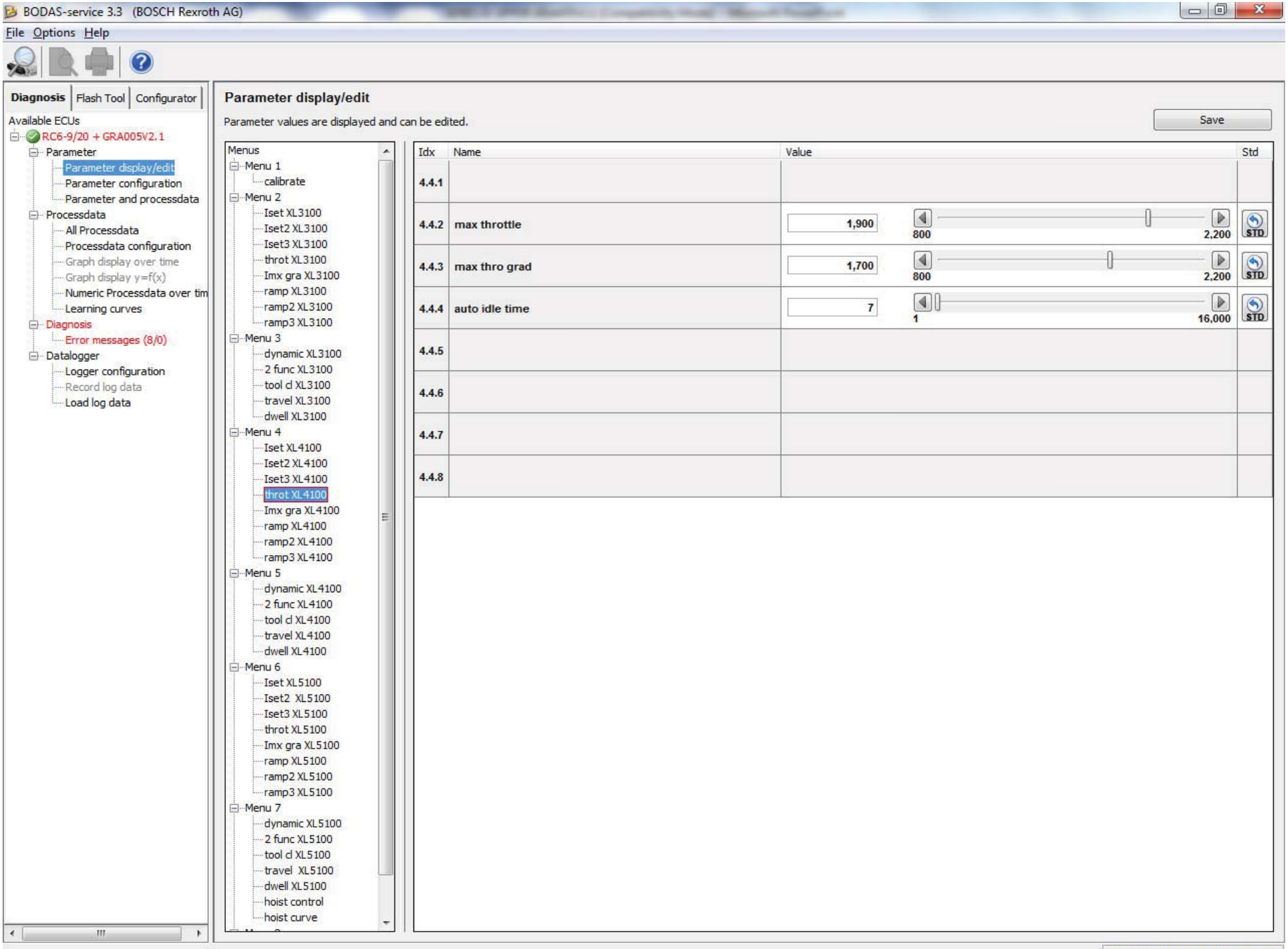

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dwell XL5100
hoist control
hoist curve
Idx
Name
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Std
3.4.1 trv fwd lmx lo 730 600 2,200 STD
3.4.2 trv rev lmx lo 700 600 2,200 STD
3.4.3 trv fwd lmx hi 1,100 600 2,200 STD
3.4.4 trv rev lmx hi 900 600 2,200 STD
3.4.5
3.4.6 mtr jog pauseT 1,000 10 10,000 STD
3.4.7 mtr jog T 2,000 10 10,000 STD
3.4.8 mtr jog I 30 1 50 STD
RC6-9/20 + GRA005V2.1 + COM: 4

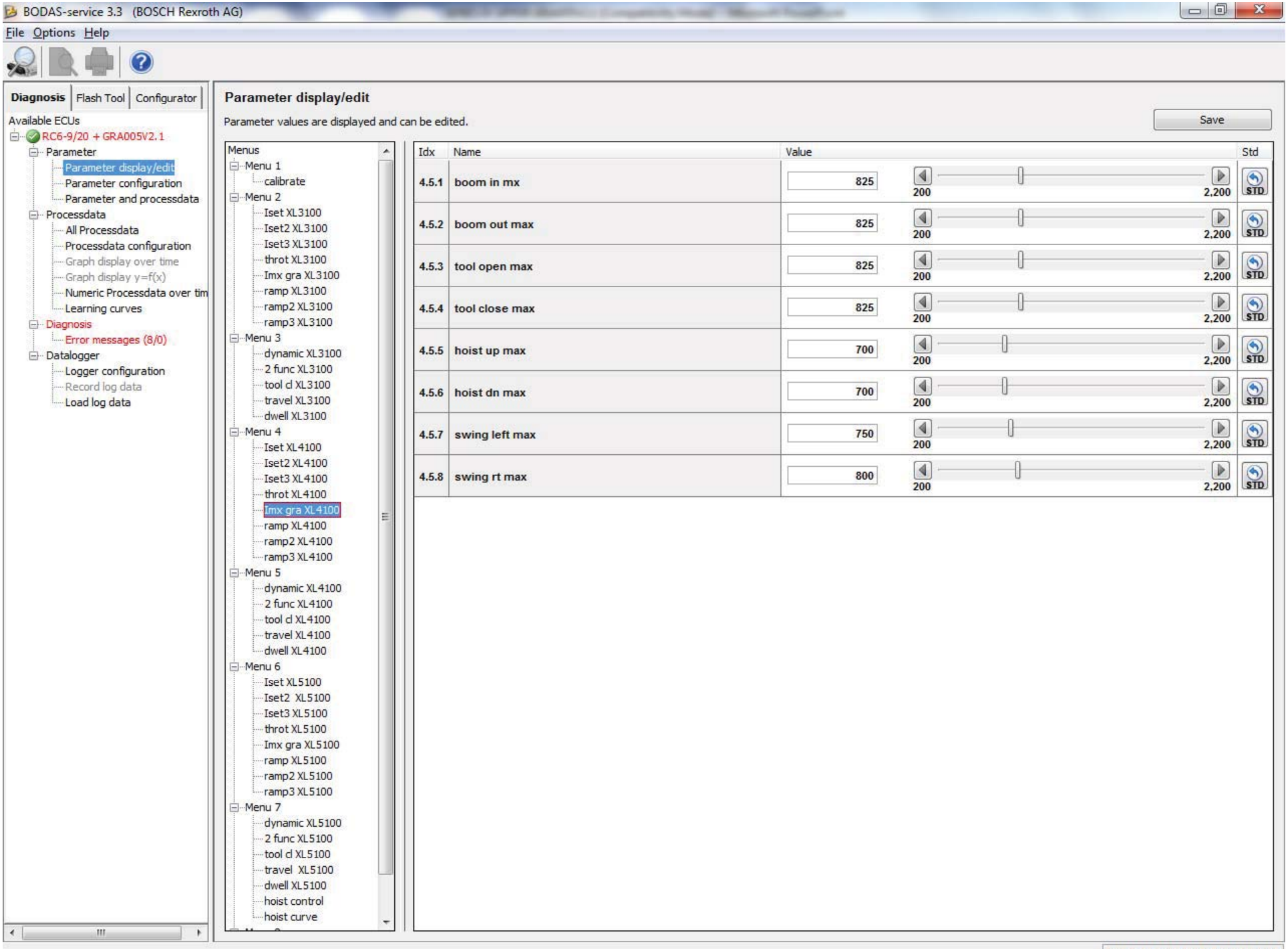

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Iset XL4100
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ramp XL4100
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Imx gra XL5100
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ramp3 XL5100
Menu 7
dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
3.5.1 dwell enable 1 0 1 STD
3.5.2 dwell I % 1 1 100 STD
3.5.3 dwell T 3,000 100 10,000 STD
3.5.4 dwell Imin lf 260 10 500 STD
3.5.5 dwell Imin rt 260 10 500 STD
3.5.6 dwell ramp 1 1 10,000 STD
3.5.7
3.5.8
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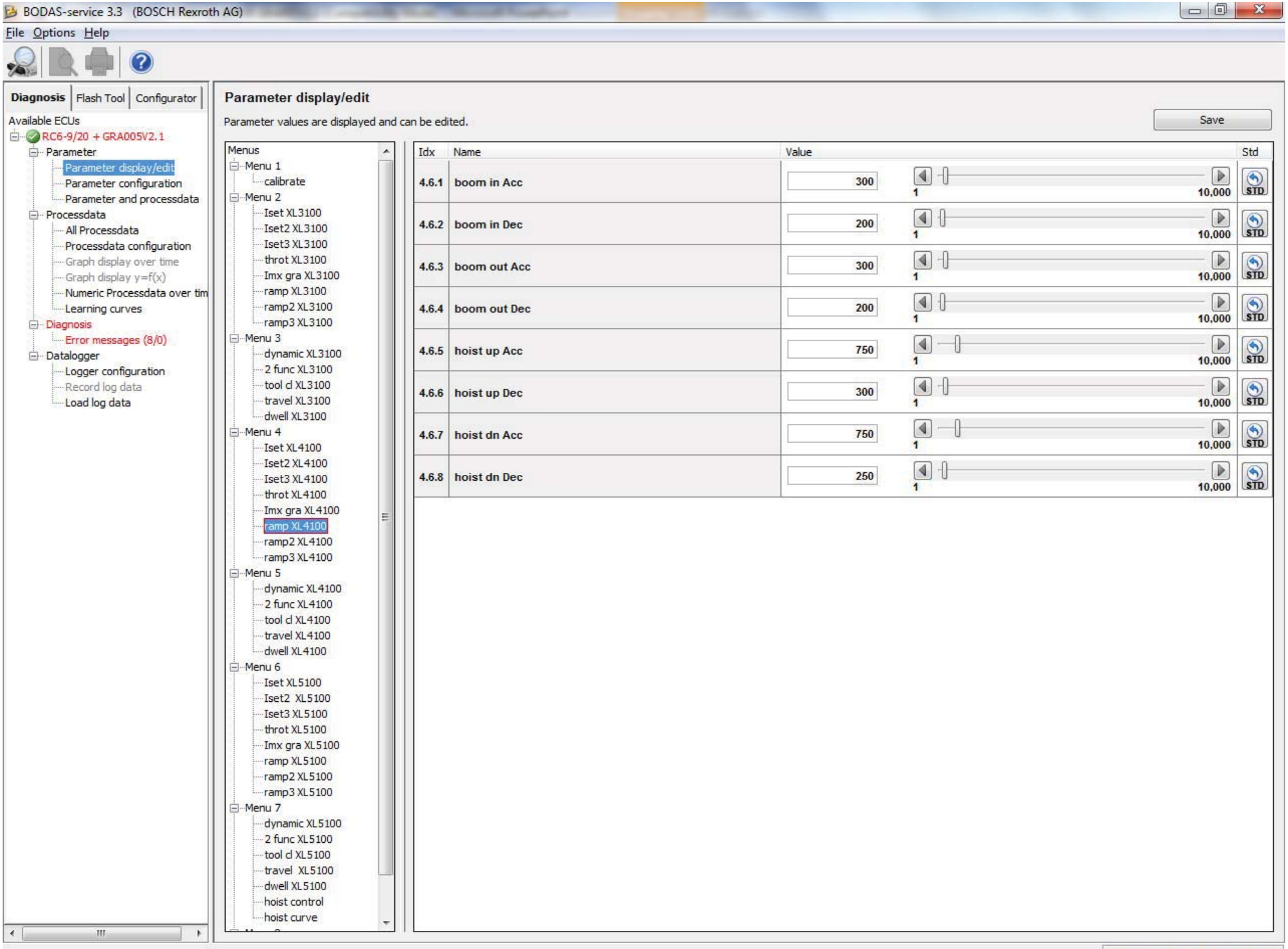

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Imx gra XL5100
ramp XL5100
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Menu 7
dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
4.1.1 boom in Imn 300 200 2,200 STD
4.1.2 boom in Imx 900 200 2,200 STD
4.1.3 boom out Imn 250 200 2,200 STD
4.1.4 boom out Imx 900 200 2,200 STD
4.1.5 tool open Imn 400 200 2,200 STD
4.1.6 tool open Imx 885 200 2,200 STD
4.1.7 tool close Imn 400 200 2,200 STD
4.1.8 tool close Imx 900 200 2,200 STD
RC6-9/20 + GRA005V2.1 + COM: 4

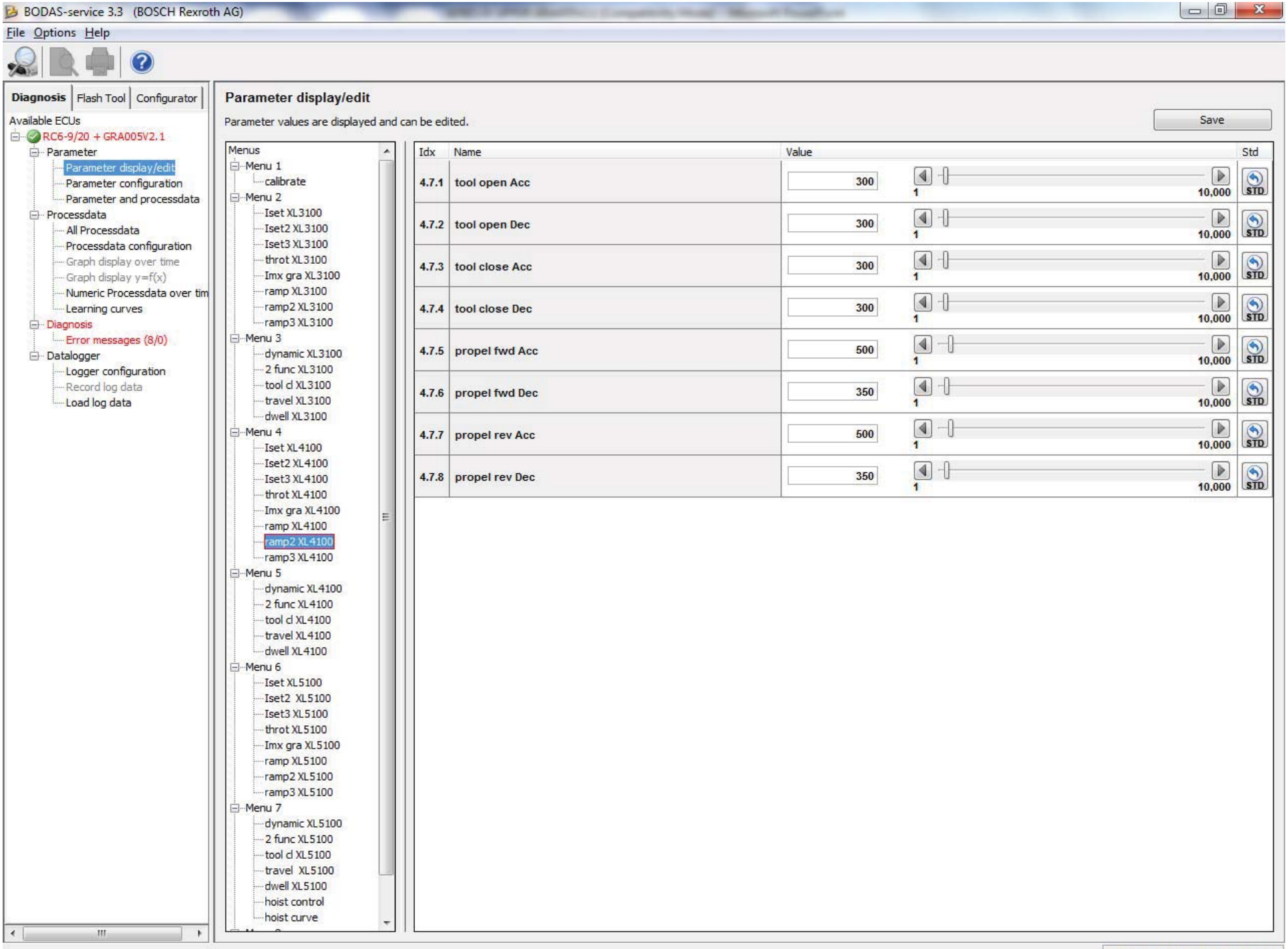

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tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
4.2.1 hoist up lmn 400 200 2,200 STD
4.2.2 hoist up lmx 950 200 2,200 STD
4.2.3 hoist down lmn 375 200 2,200 STD
4.2.4 hoist down lmx 900 200 2,200 STD
4.2.5 swing left lmn 275 200 2,200 STD
4.2.6 swing left lmx 860 200 2,200 STD
4.2.7 swing rt lmn 275 200 2,200 STD
4.2.8 swing rt lmx 860 200 2,200 STD
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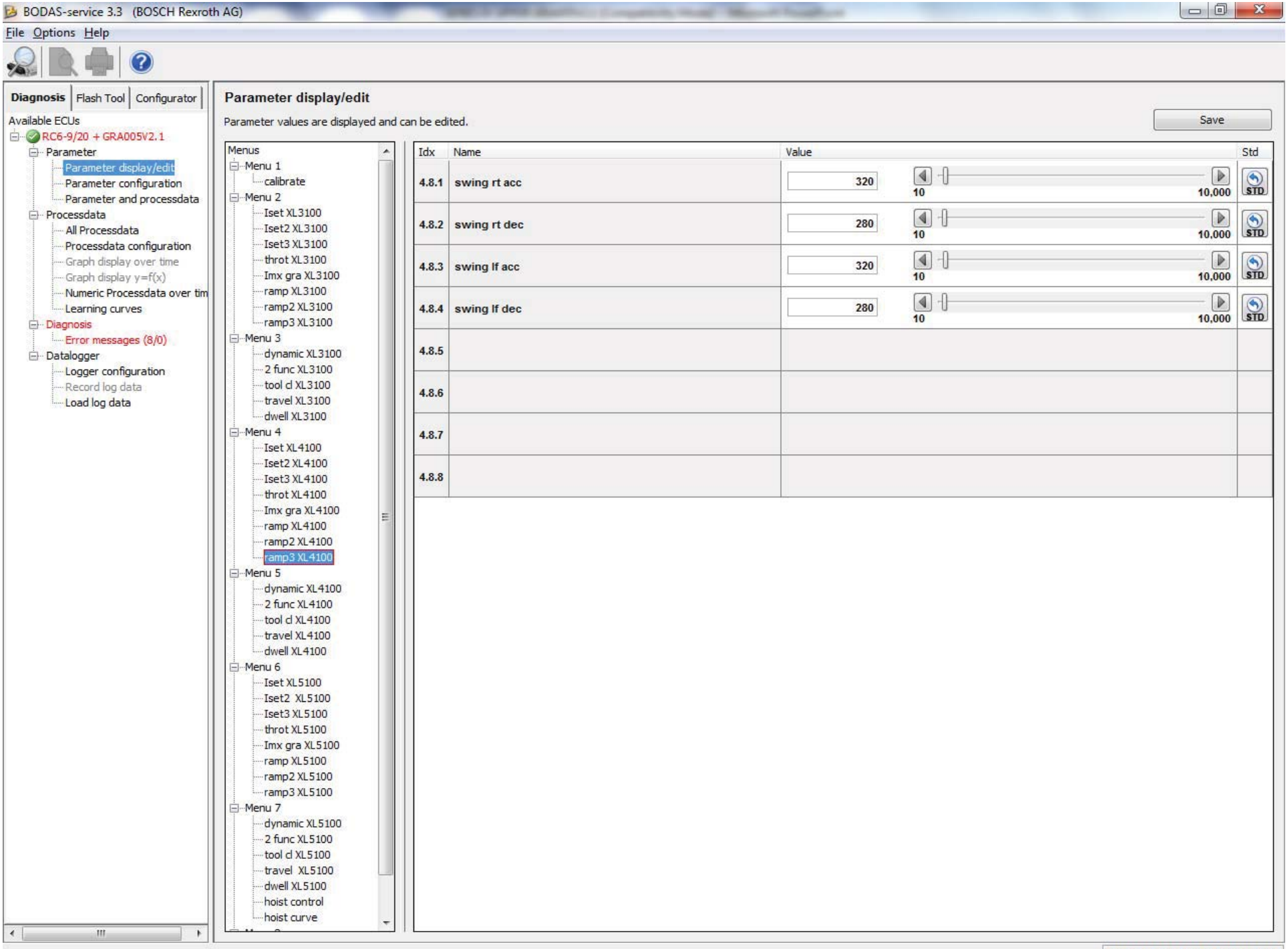

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tool cl XL5100
travel XL5100
dwell XL5100
hoist control
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Idx
Name
Value
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4.3.1 travel fwd lmn 410 200 2,200 STD
4.3.2
4.3.3 travel rev lmn 400 200 2,200 STD
4.3.4
4.3.5 heater lmn 475 200 2,200 STD
4.3.6 heater lmx 770 200 2,200 STD
4.3.7 oil fan lmn 470 0 2,200 STD
4.3.8 oil fan lmx 1,000 200 2,200 STD
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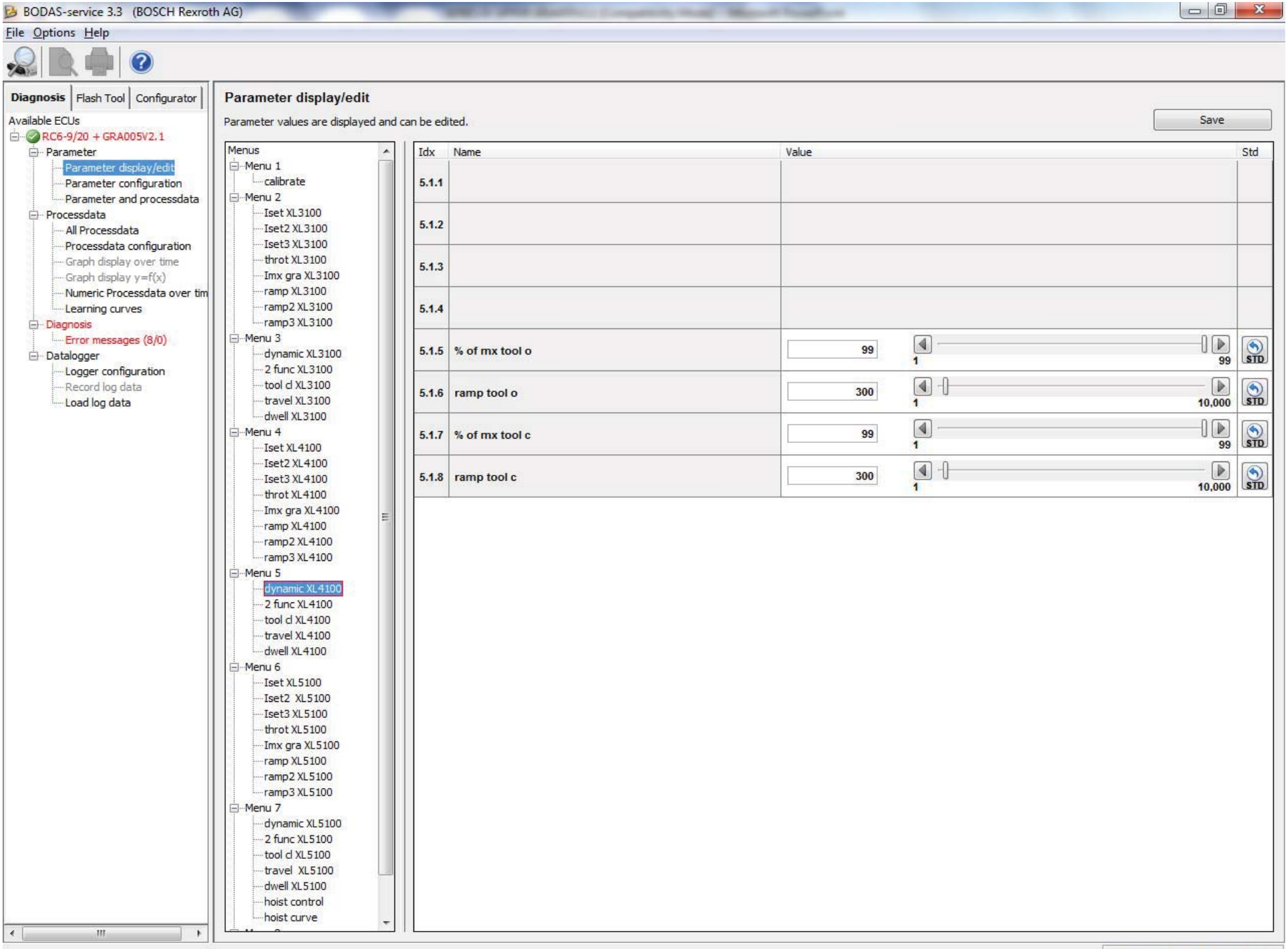

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4.4.2
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1,900
800
2,200
STD
4.4.3
max thro grad
1,700
800
2,200
STD
4.4.4
auto idle time
7
1
16,000
STD
4.4.5
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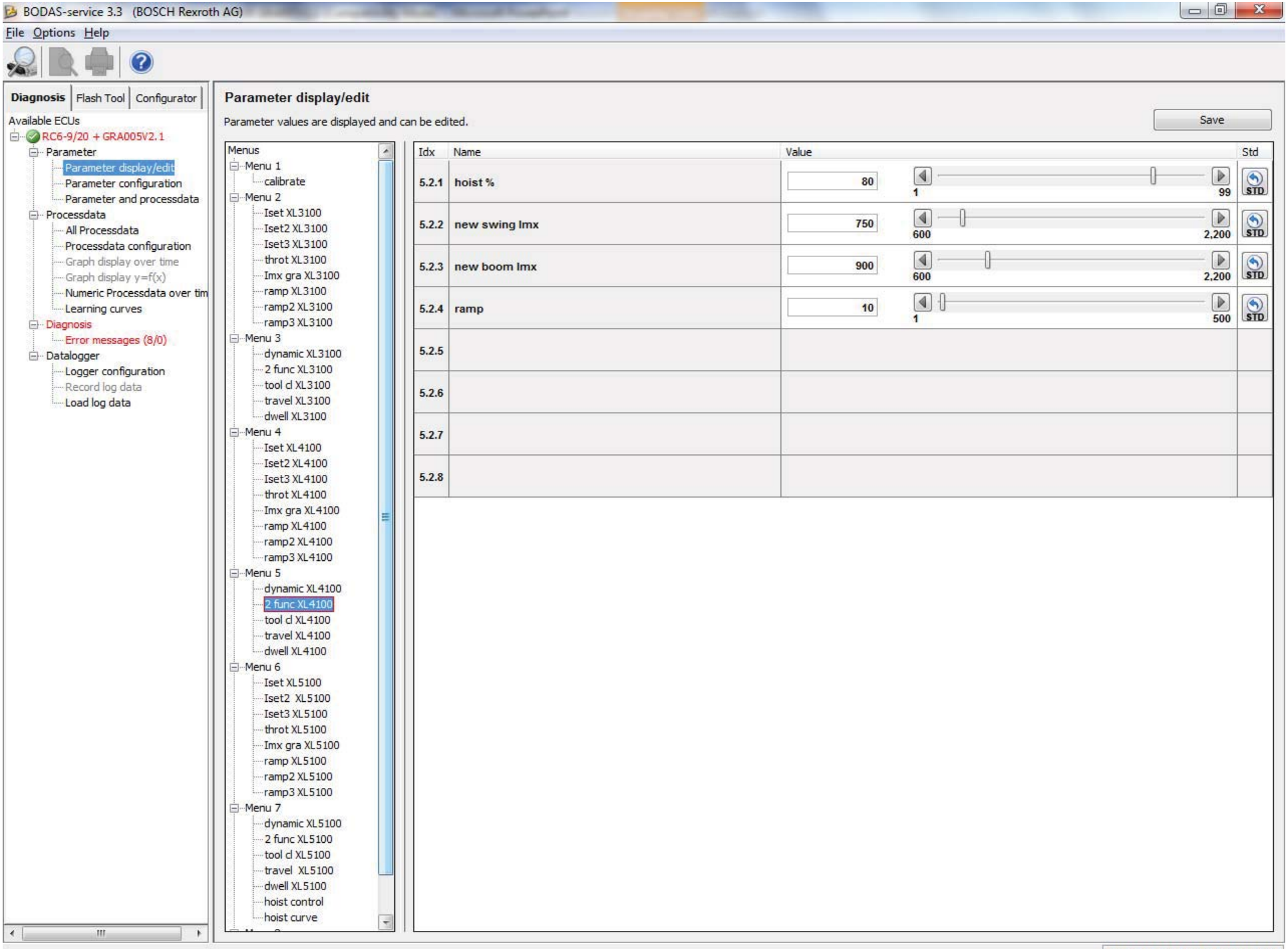

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Imx gra XL5100
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2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
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Idx
Name
Value
Std
4.5.1 boom in mx 825 200 2,200 STD
4.5.2 boom out max 825 200 2,200 STD
4.5.3 tool open max 825 200 2,200 STD
4.5.4 tool close max 825 200 2,200 STD
4.5.5 hoist up max 700 200 2,200 STD
4.5.6 hoist dn max 700 200 2,200 STD
4.5.7 swing left max 750 200 2,200 STD
4.5.8 swing rt max 800 200 2,200 STD
RC6-9/20 + GRA005V2.1 + COM: 4

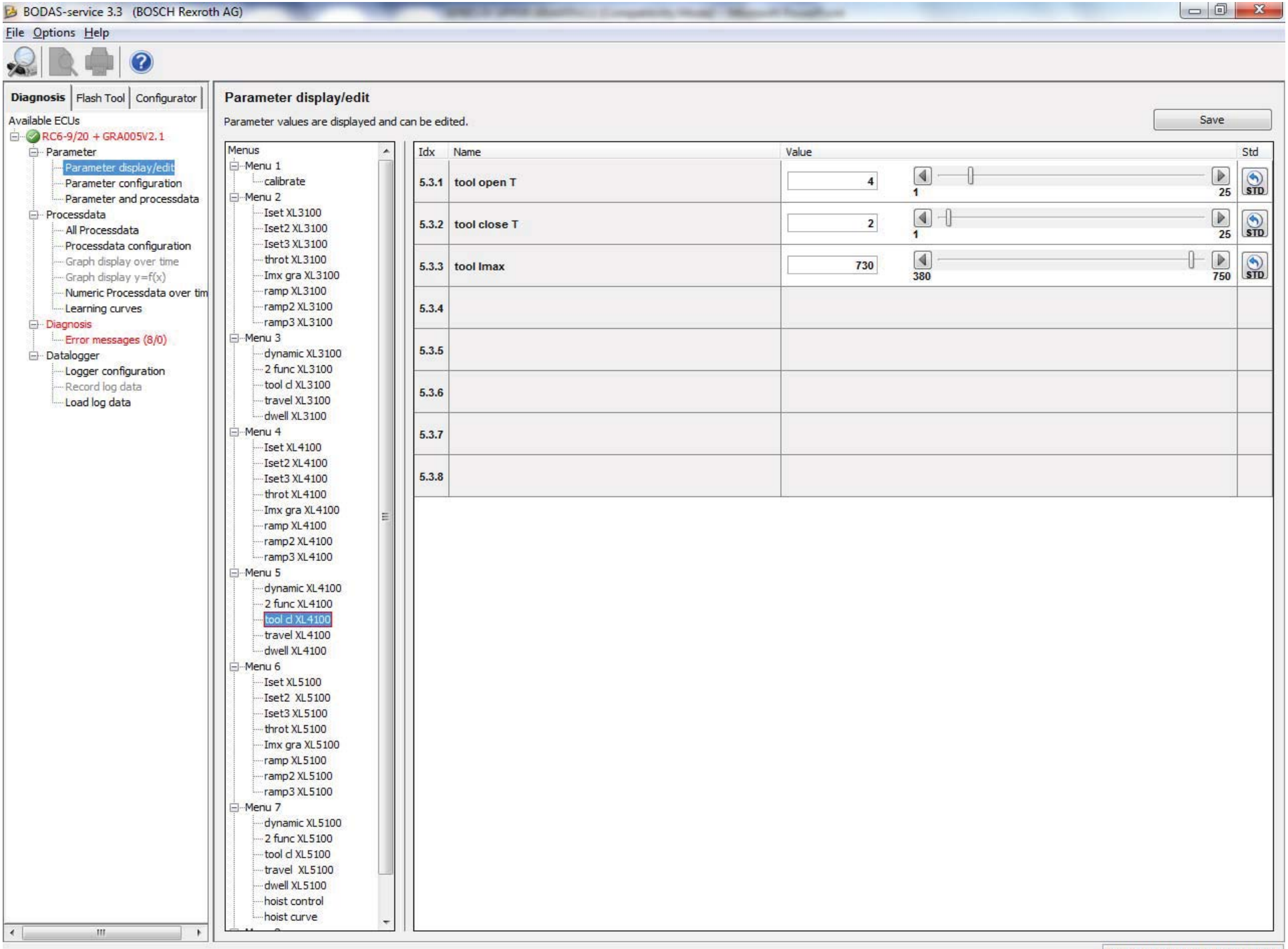

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4.6.1 boom in Acc 300 1 10,000 STD
4.6.2 boom in Dec 200 1 10,000 STD
4.6.3 boom out Acc 300 1 10,000 STD
4.6.4 boom out Dec 200 1 10,000 STD
4.6.5 hoist up Acc 750 1 10,000 STD
4.6.6 hoist up Dec 300 1 10,000 STD
4.6.7 hoist dn Acc 750 1 10,000 STD
4.6.8 hoist dn Dec 250 1 10,000 STD
RC6-9/20 + GRA005V2.1 + COM: 4

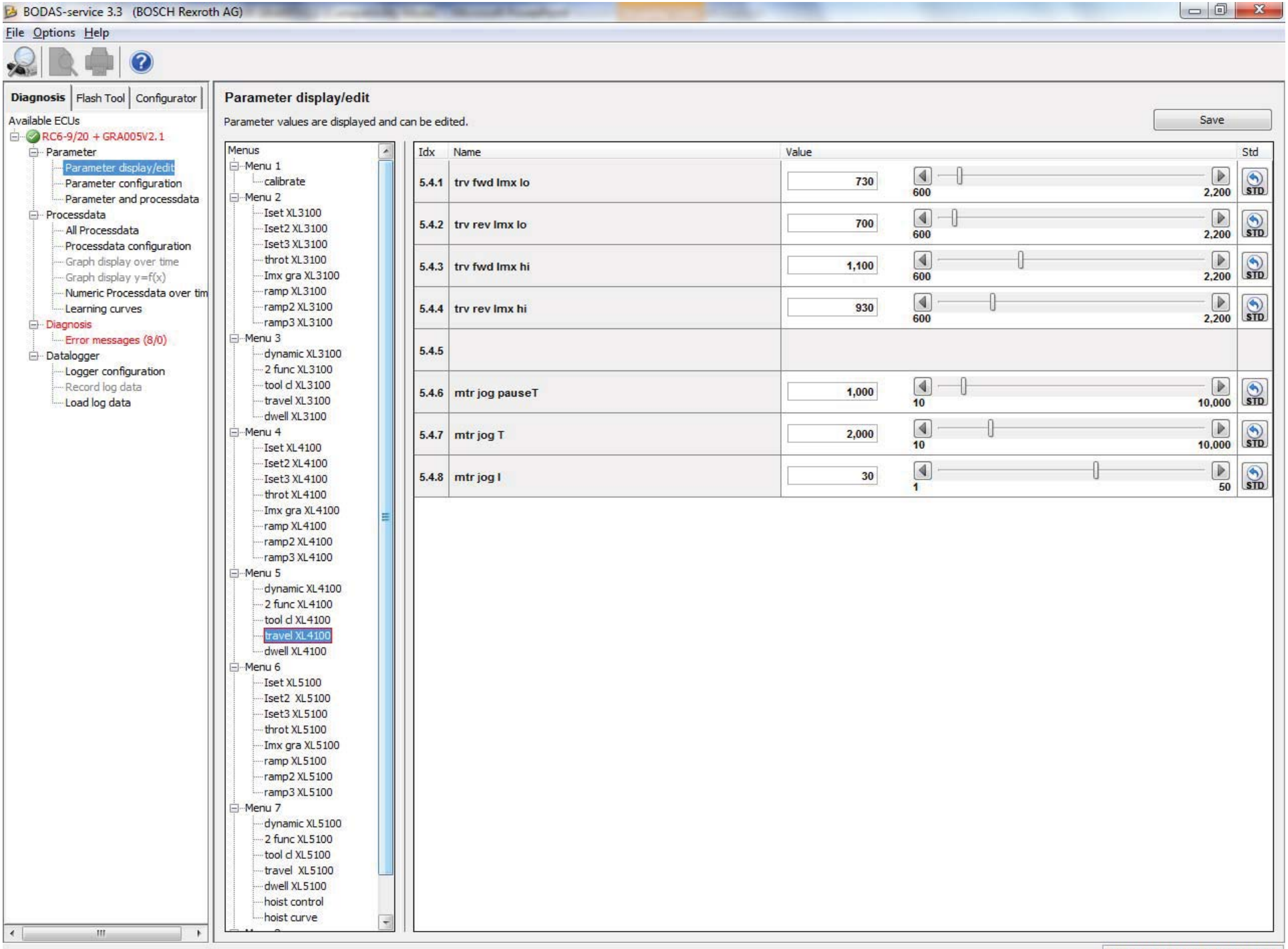

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2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
4.7.1 tool open Acc 300 1 10,000 STD
4.7.2 tool open Dec 300 1 10,000 STD
4.7.3 tool close Acc 300 1 10,000 STD
4.7.4 tool close Dec 300 1 10,000 STD
4.7.5 propel fwd Acc 500 1 10,000 STD
4.7.6 propel fwd Dec 350 1 10,000 STD
4.7.7 propel rev Acc 500 1 10,000 STD
4.7.8 propel rev Dec 350 1 10,000 STD
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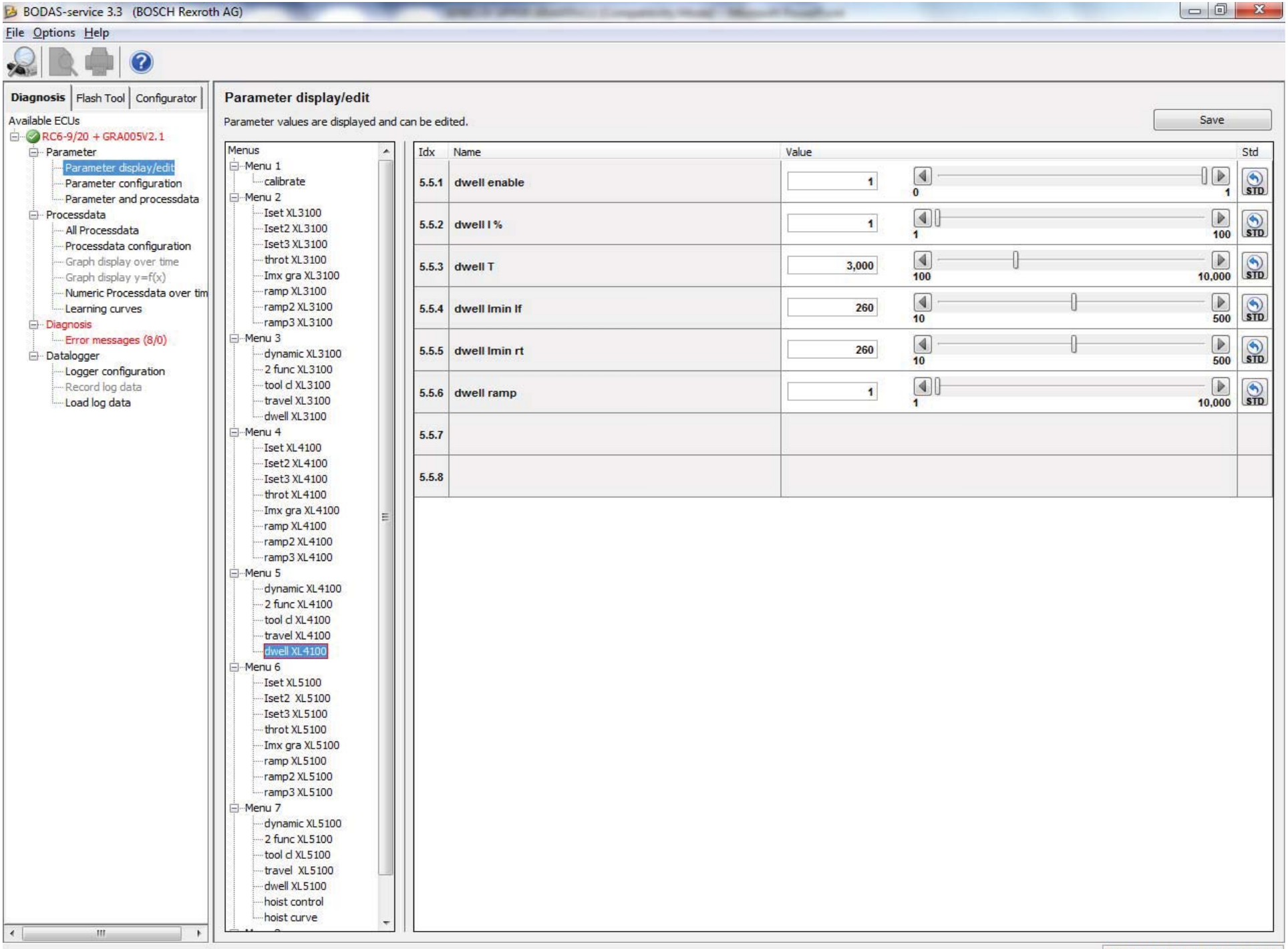

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2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
4.8.1 swing rt acc 320 10 10,000 STD
4.8.2 swing rt dec 280 10 10,000 STD
4.8.3 swing lf acc 320 10 10,000 STD
4.8.4 swing lf dec 280 10 10,000 STD
4.8.5
4.8.6
4.8.7
4.8.8
RC6-9/20 + GRA005V2.1 + COM: 4

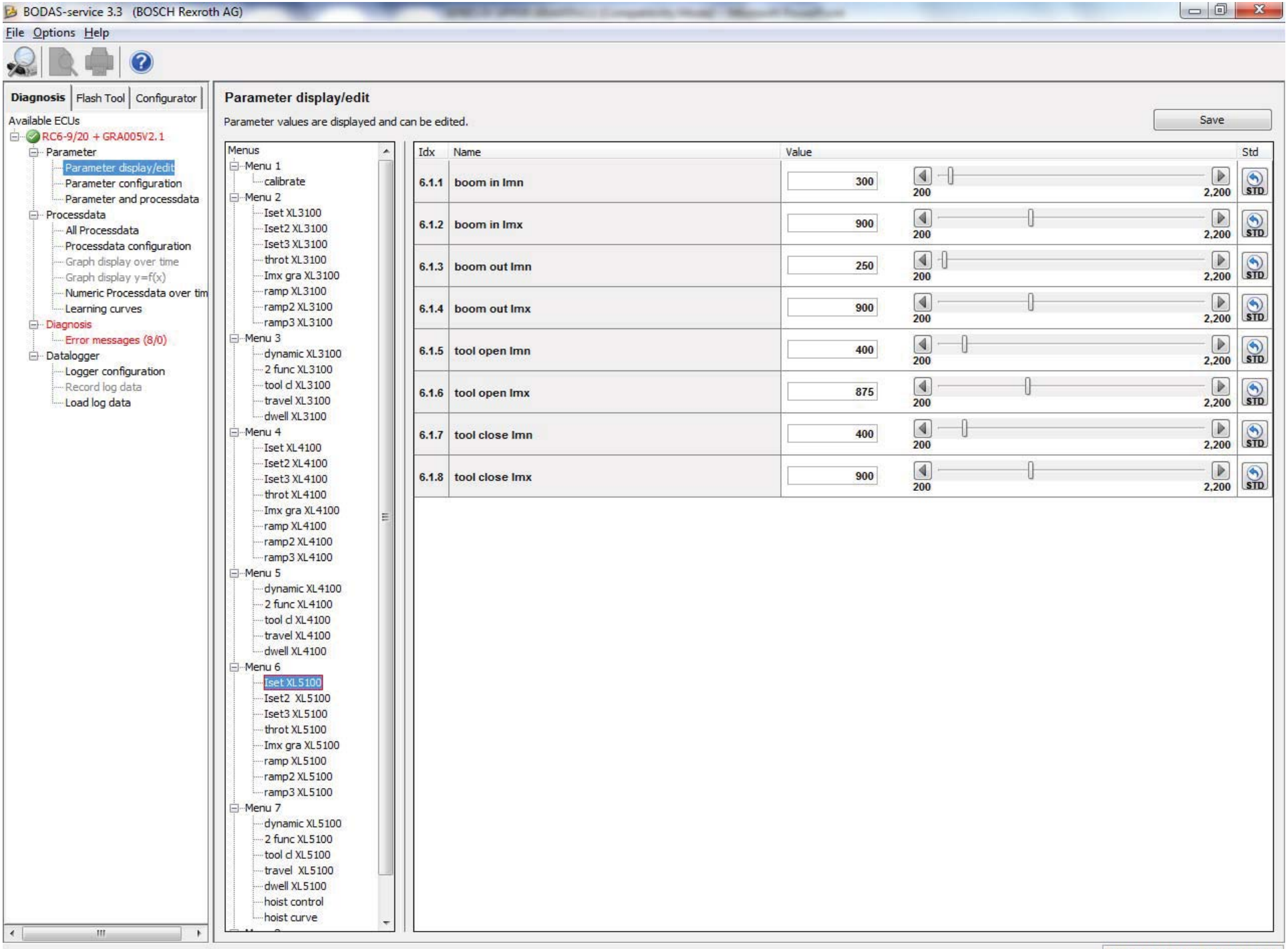

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Imx gra XL5100
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ramp3 XL5100
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dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
5.1.1
5.1.2
5.1.3
5.1.4
5.1.5
% of mx tool o
99
1
99
STD
5.1.6
ramp tool o
300
1
10,000
STD
5.1.7
% of mx tool c
99
1
99
STD
5.1.8
ramp tool c
300
1
10,000
STD
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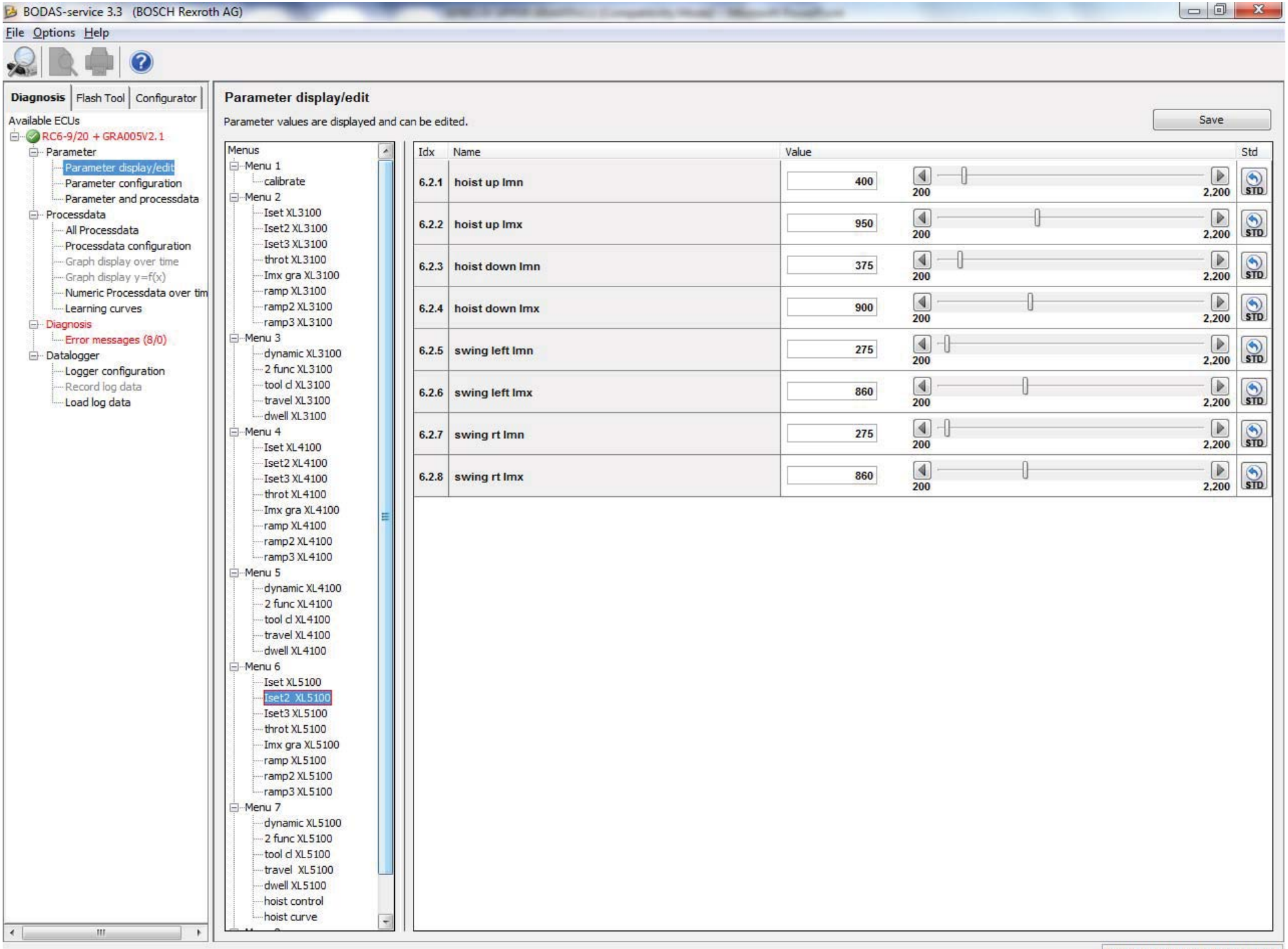

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Imx gra XL3100
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Iset3 XL5100
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Imx gra XL5100
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ramp2 XL5100
ramp3 XL5100
Menu 7
dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
5.2.1 hoist % 80 1 99 STD
5.2.2 new swing Imx 750 600 2,200 STD
5.2.3 new boom Imx 900 600 2,200 STD
5.2.4 ramp 10 1 500 STD
5.2.5
5.2.6
5.2.7
5.2.8
RC6-9/20 + GRA005V2.1 + COM: 4

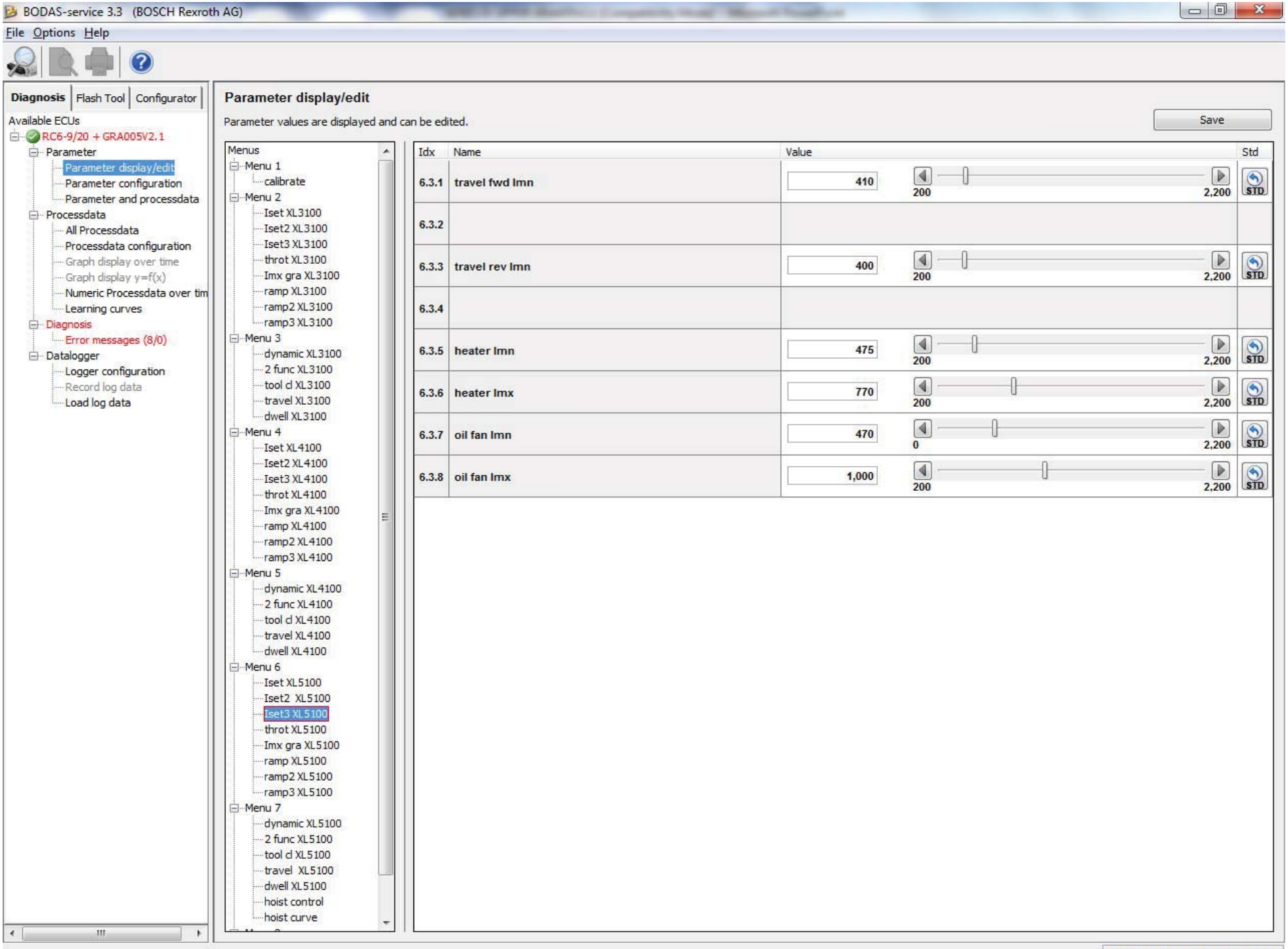

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ramp3 XL3100
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2 func XL3100
tool cl XL3100
travel XL3100
dwell XL3100
Menu 4
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Iset2 XL4100
Iset3 XL4100
throt XL4100
Imx gra XL4100
ramp XL4100
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2 func XL4100
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travel XL4100
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Iset2 XL5100
Iset3 XL5100
throt XL5100
Imx gra XL5100
ramp XL5100
ramp2 XL5100
ramp3 XL5100
Menu 7
dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
5.3.1
tool open T
4
1
25
STD
5.3.2
tool close T
2
1
25
STD
5.3.3
tool Imax
730
380
750
STD
5.3.4
5.3.5
5.3.6
5.3.7
5.3.8
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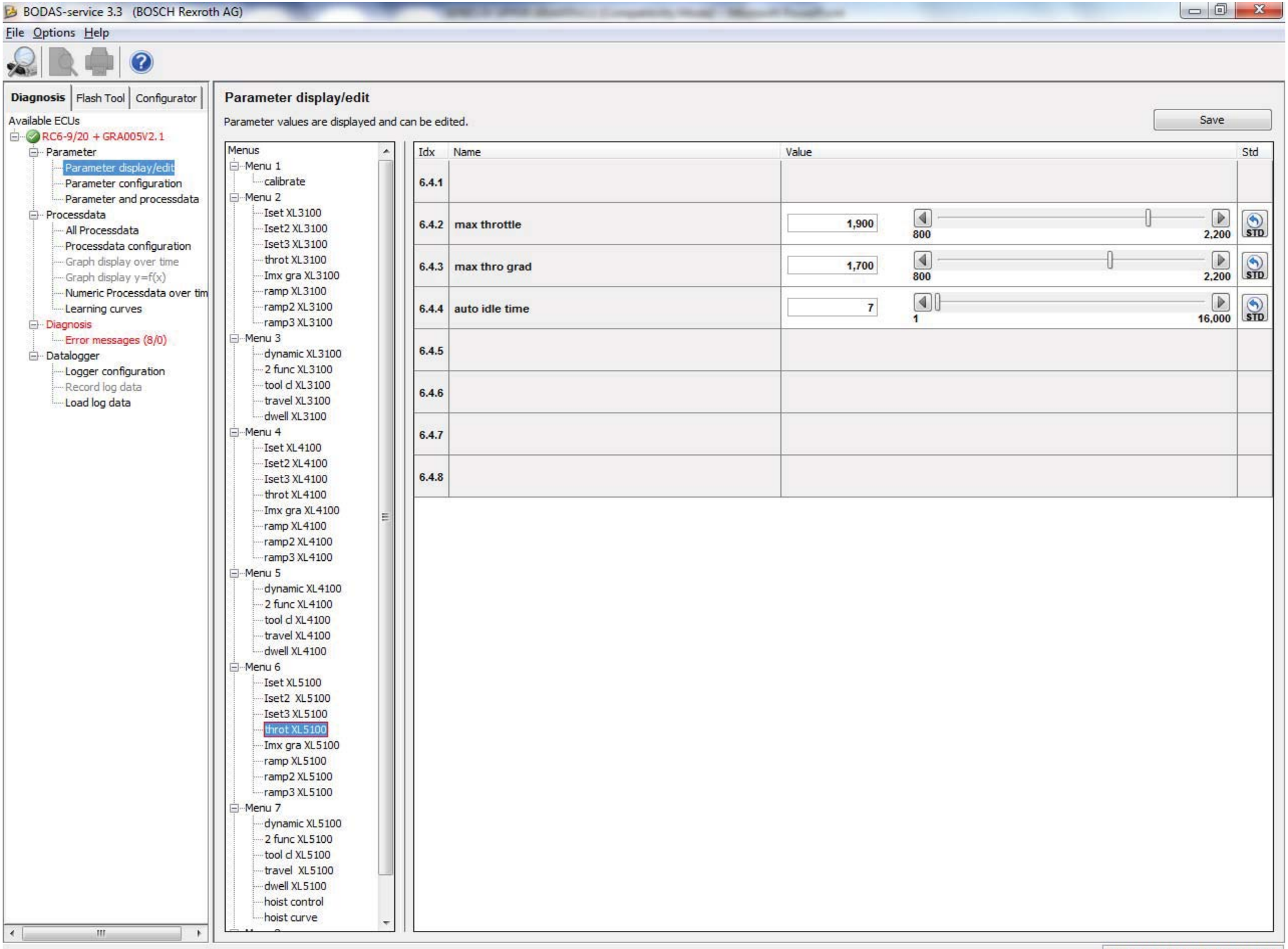

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2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
5.4.1 trv fwd lmx lo 730 600 2,200 STD
5.4.2 trv rev lmx lo 700 600 2,200 STD
5.4.3 trv fwd lmx hi 1,100 600 2,200 STD
5.4.4 trv rev lmx hi 930 600 2,200 STD
5.4.5
5.4.6 mtr jog pauseT 1,000 10 10,000 STD
5.4.7 mtr jog T 2,000 10 10,000 STD
5.4.8 mtr jog I 30 1 50 STD
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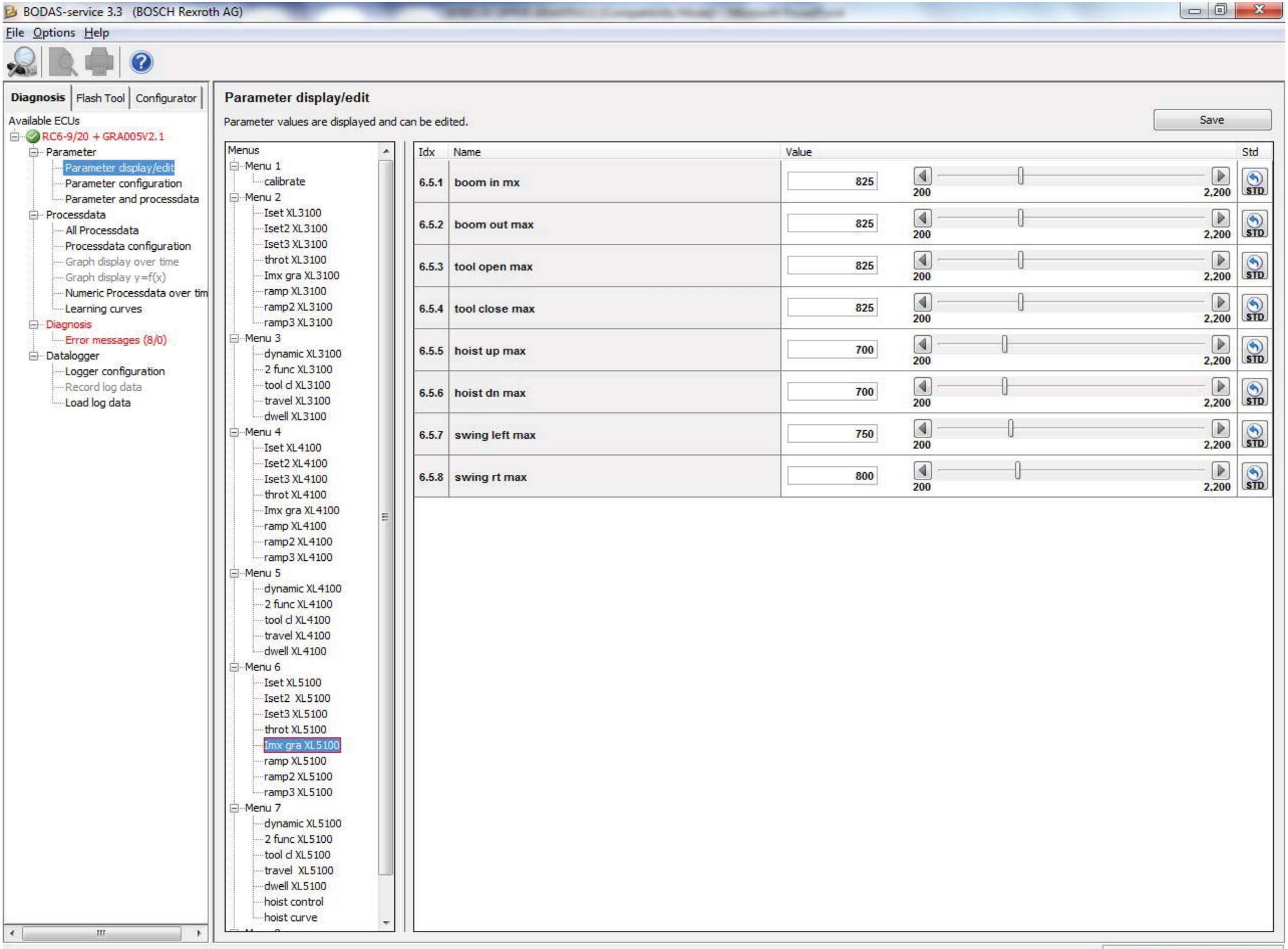

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Imx gra XL5100
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ramp3 XL5100
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2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
5.5.1 dwell enable 1 0 1 STD
5.5.2 dwell I % 1 1 100 STD
5.5.3 dwell T 3,000 100 10,000 STD
5.5.4 dwell Imin lf 260 10 500 STD
5.5.5 dwell Imin rt 260 10 500 STD
5.5.6 dwell ramp 1 1 10,000 STD
5.5.7
5.5.8
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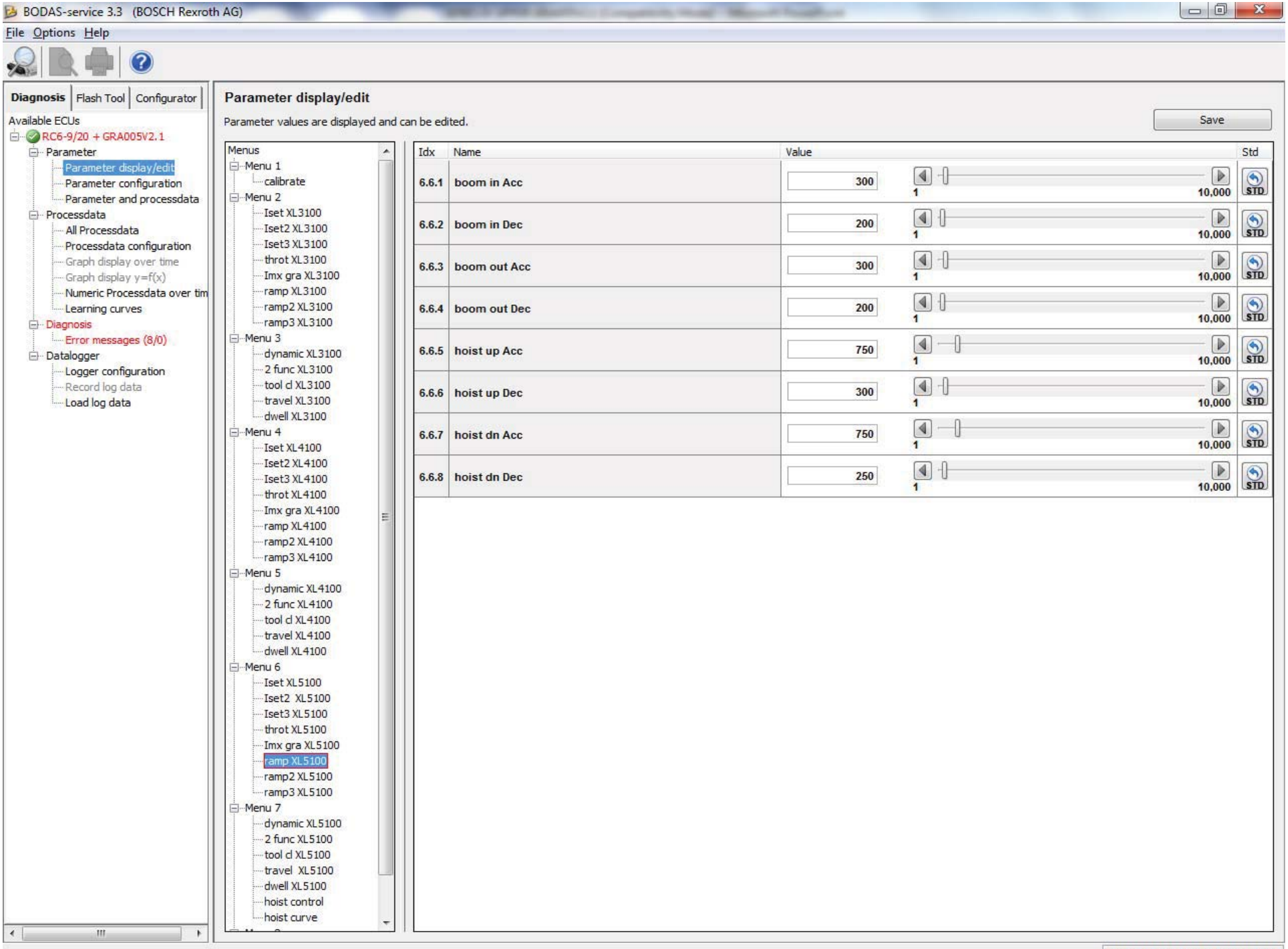

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Imx gra XL5100
ramp XL5100
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ramp3 XL5100
Menu 7
dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
6.1.1 boom in Imn 300 200 2,200 STD
6.1.2 boom in Imx 900 200 2,200 STD
6.1.3 boom out Imn 250 200 2,200 STD
6.1.4 boom out Imx 900 200 2,200 STD
6.1.5 tool open Imn 400 200 2,200 STD
6.1.6 tool open Imx 875 200 2,200 STD
6.1.7 tool close Imn 400 200 2,200 STD
6.1.8 tool close Imx 900 200 2,200 STD
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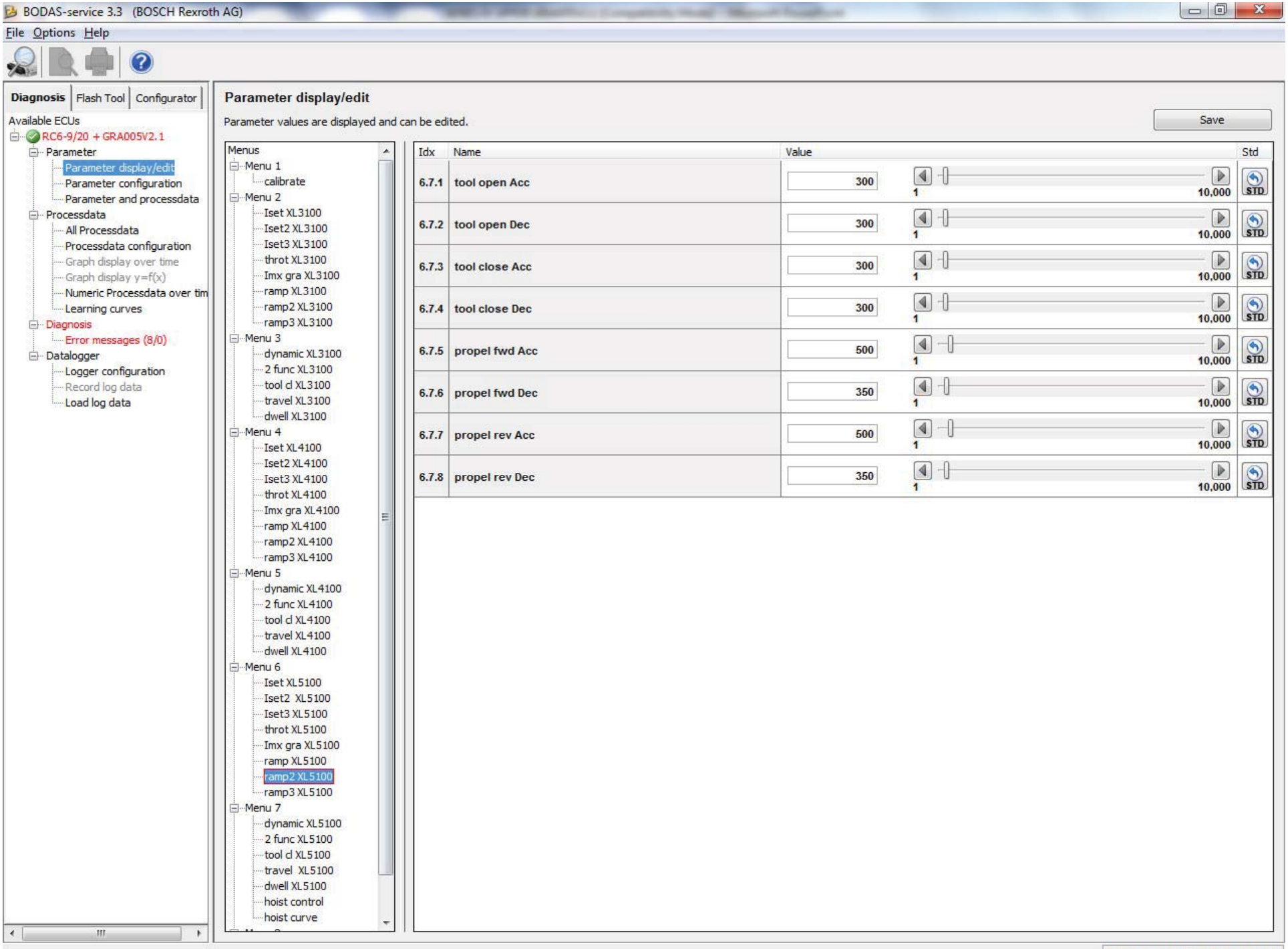

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Imx gra XL5100
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ramp3 XL5100
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travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
6.2.1 hoist up lmn 400 200 2,200 STD
6.2.2 hoist up lmx 950 200 2,200 STD
6.2.3 hoist down lmn 375 200 2,200 STD
6.2.4 hoist down lmx 900 200 2,200 STD
6.2.5 swing left lmn 275 200 2,200 STD
6.2.6 swing left lmx 860 200 2,200 STD
6.2.7 swing rt lmn 275 200 2,200 STD
6.2.8 swing rt lmx 860 200 2,200 STD
RC6-9/20 + GRA005V2.1 + COM: 4

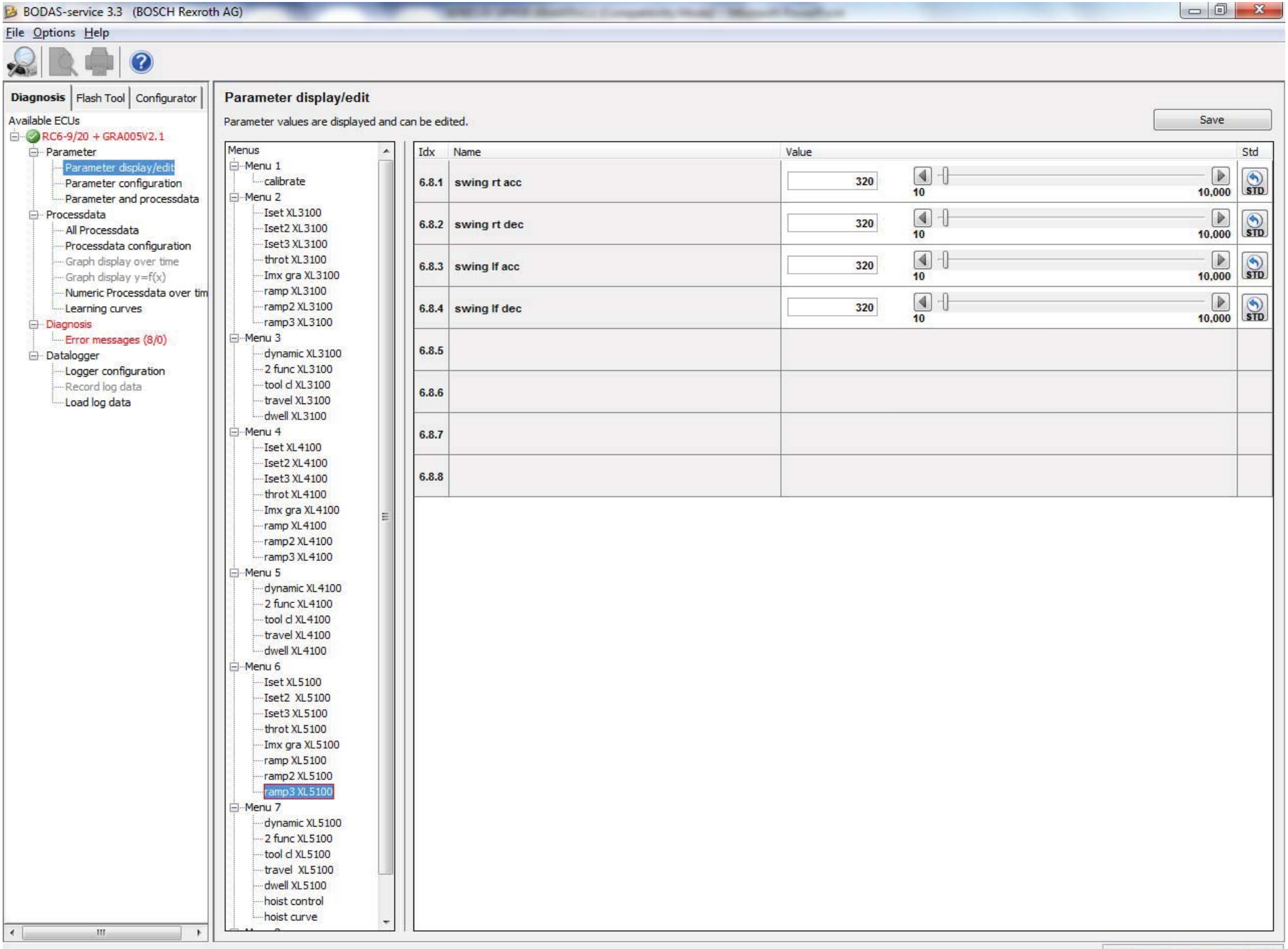

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Menu 2
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Iset2 XL3100
Iset3 XL3100
throt XL3100
Imx gra XL3100
ramp XL3100
ramp2 XL3100
ramp3 XL3100
Menu 3
dynamic XL3100
2 func XL3100
tool cl XL3100
travel XL3100
dwell XL3100
Menu 4
Iset XL4100
Iset2 XL4100
Iset3 XL4100
throt XL4100
Imx gra XL4100
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Menu 6
Iset XL5100
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Imx gra XL5100
ramp XL5100
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Menu 7
dynamic XL5100
2 func XL5100
tool cl XL5100
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Idx
Name
Value
Std
6.3.1 travel fwd lmn 410 200 2,200 STD
6.3.2
6.3.3 travel rev lmn 400 200 2,200 STD
6.3.4
6.3.5 heater lmn 475 200 2,200 STD
6.3.6 heater lmx 770 200 2,200 STD
6.3.7 oil fan lmn 470 0 2,200 STD
6.3.8 oil fan lmx 1,000 200 2,200 STD
RC6-9/20 + GRA005V2.1 + COM: 4

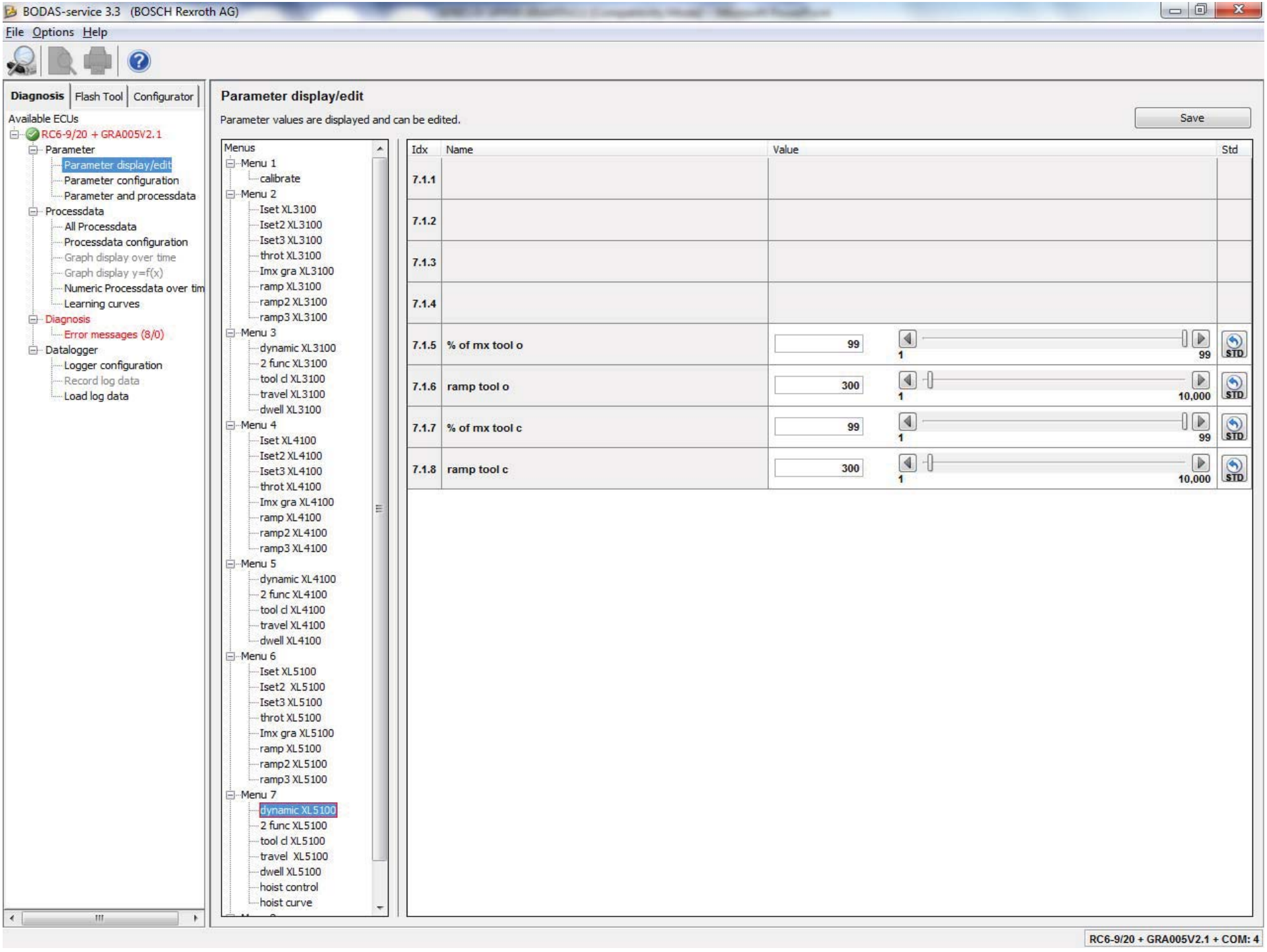

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dwell XL3100
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Iset3 XL4100
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Imx gra XL4100
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ramp2 XL4100
ramp3 XL4100
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tool cl XL4100
travel XL4100
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Iset3 XL5100
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Imx gra XL5100
ramp XL5100
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Menu 7
dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
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hoist control
hoist curve
Idx
Name
Value
Std
6.4.1
6.4.2
max throttle
1,900
800
2,200
STD
6.4.3
max thro grad
1,700
800
2,200
STD
6.4.4
auto idle time
7
1
16,000
STD
6.4.5
6.4.6
6.4.7
6.4.8
RC6-9/20 + GRA005V2.1 + COM: 4

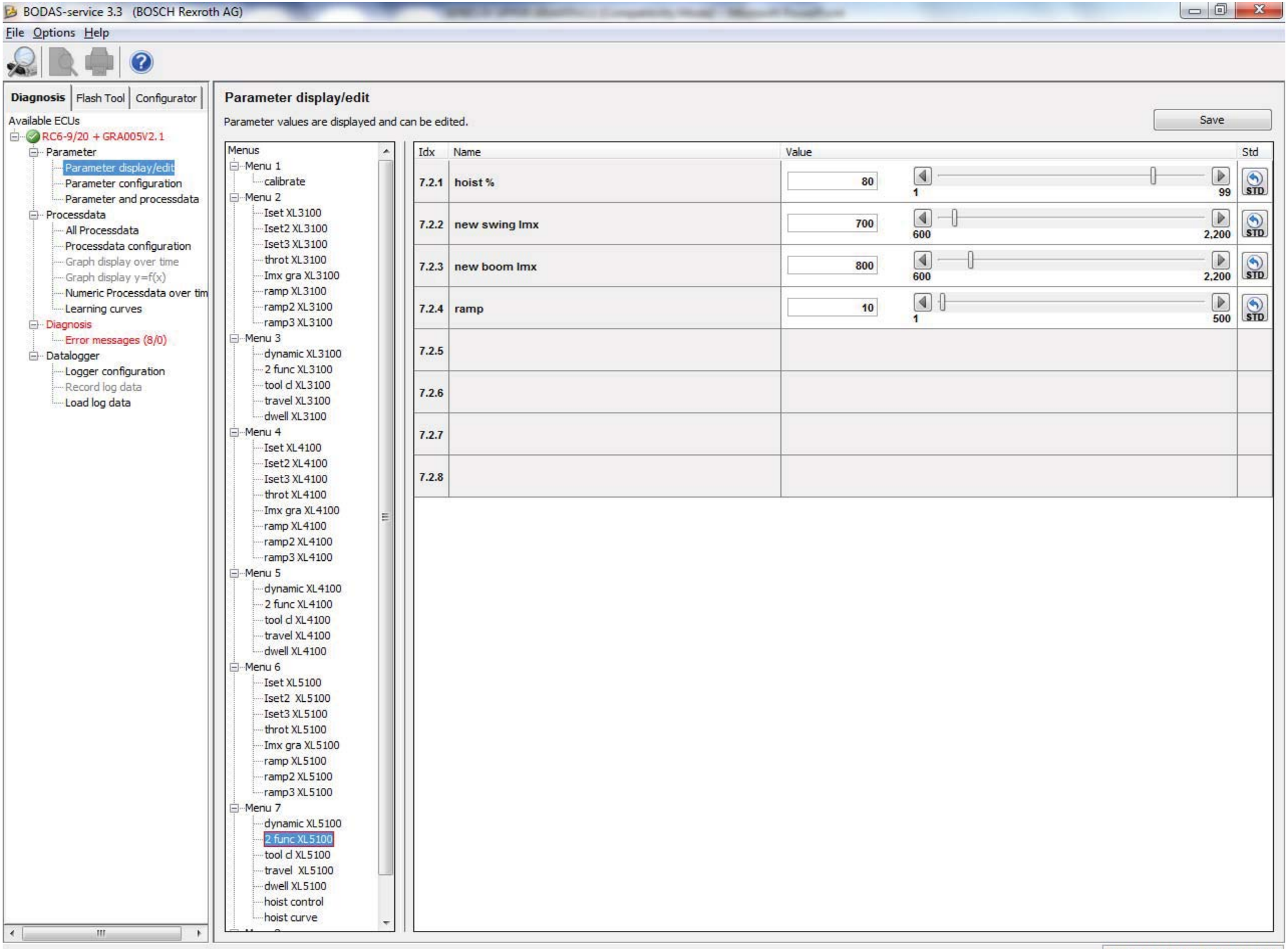

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dwell XL3100
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Imx gra XL4100
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2 func XL4100
tool cl XL4100
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Iset3 XL5100
throt XL5100
Imx gra XL5100
ramp XL5100
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ramp3 XL5100
Menu 7
dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
6.5.1 boom in mx 825 200 2,200 STD
6.5.2 boom out max 825 200 2,200 STD
6.5.3 tool open max 825 200 2,200 STD
6.5.4 tool close max 825 200 2,200 STD
6.5.5 hoist up max 700 200 2,200 STD
6.5.6 hoist dn max 700 200 2,200 STD
6.5.7 swing left max 750 200 2,200 STD
6.5.8 swing rt max 800 200 2,200 STD
RC6-9/20 + GRA005V2.1 + COM: 4

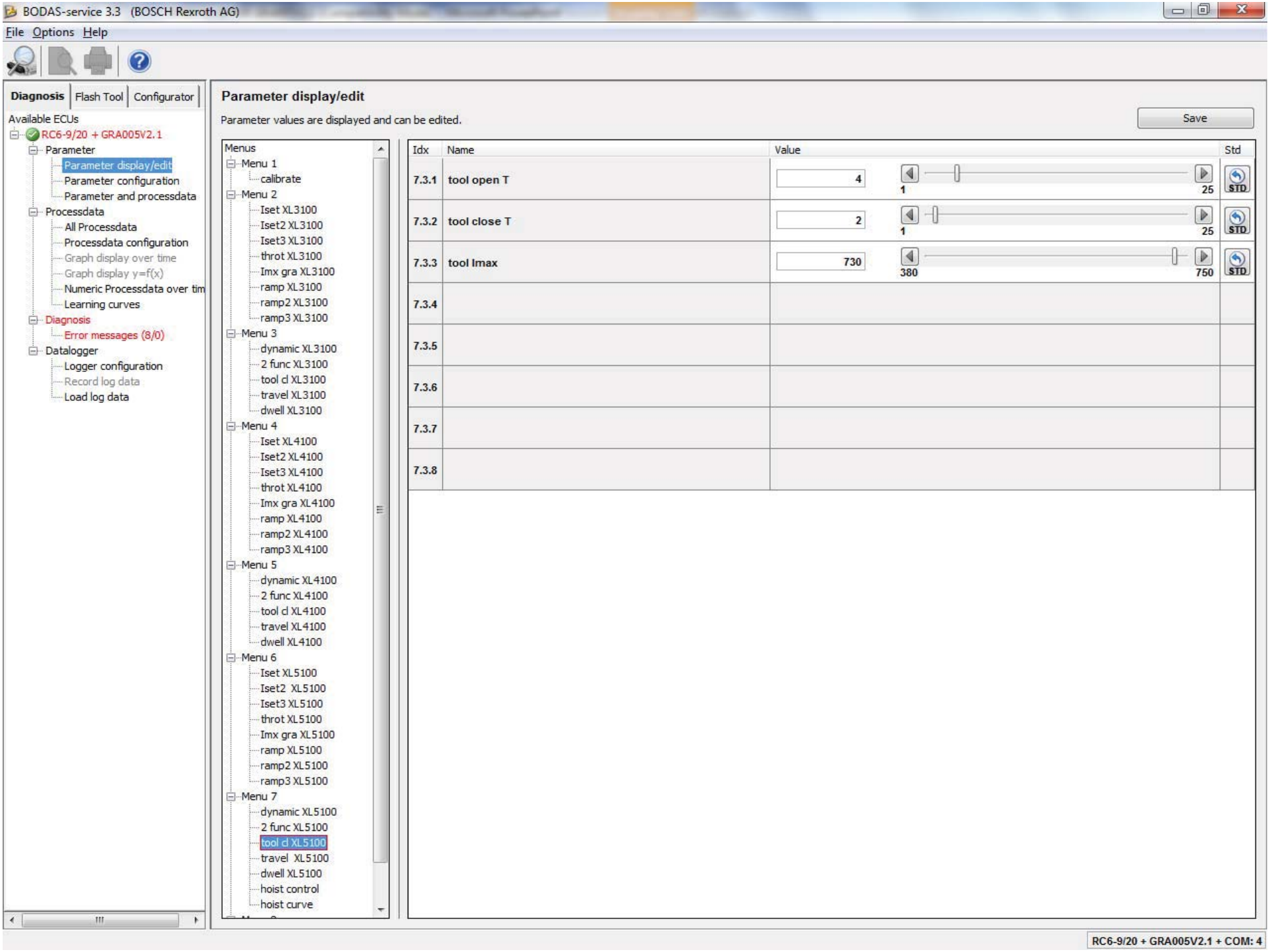

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Imx gra XL3100
ramp XL3100
ramp2 XL3100
ramp3 XL3100
Menu 3
dynamic XL3100
2 func XL3100
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travel XL3100
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Menu 4
Iset XL4100
Iset2 XL4100
Iset3 XL4100
throt XL4100
Imx gra XL4100
ramp XL4100
ramp2 XL4100
ramp3 XL4100
Menu 5
dynamic XL4100
2 func XL4100
tool cl XL4100
travel XL4100
dwell XL4100
Menu 6
Iset XL5100
Iset2 XL5100
Iset3 XL5100
throt XL5100
Imx gra XL5100
ramp XL5100
ramp2 XL5100
ramp3 XL5100
Menu 7
dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
6.6.1 boom in Acc 300 1 10,000 STD
6.6.2 boom in Dec 200 1 10,000 STD
6.6.3 boom out Acc 300 1 10,000 STD
6.6.4 boom out Dec 200 1 10,000 STD
6.6.5 hoist up Acc 750 1 10,000 STD
6.6.6 hoist up Dec 300 1 10,000 STD
6.6.7 hoist dn Acc 750 1 10,000 STD
6.6.8 hoist dn Dec 250 1 10,000 STD
RC6-9/20 + GRA005V2.1 + COM: 4

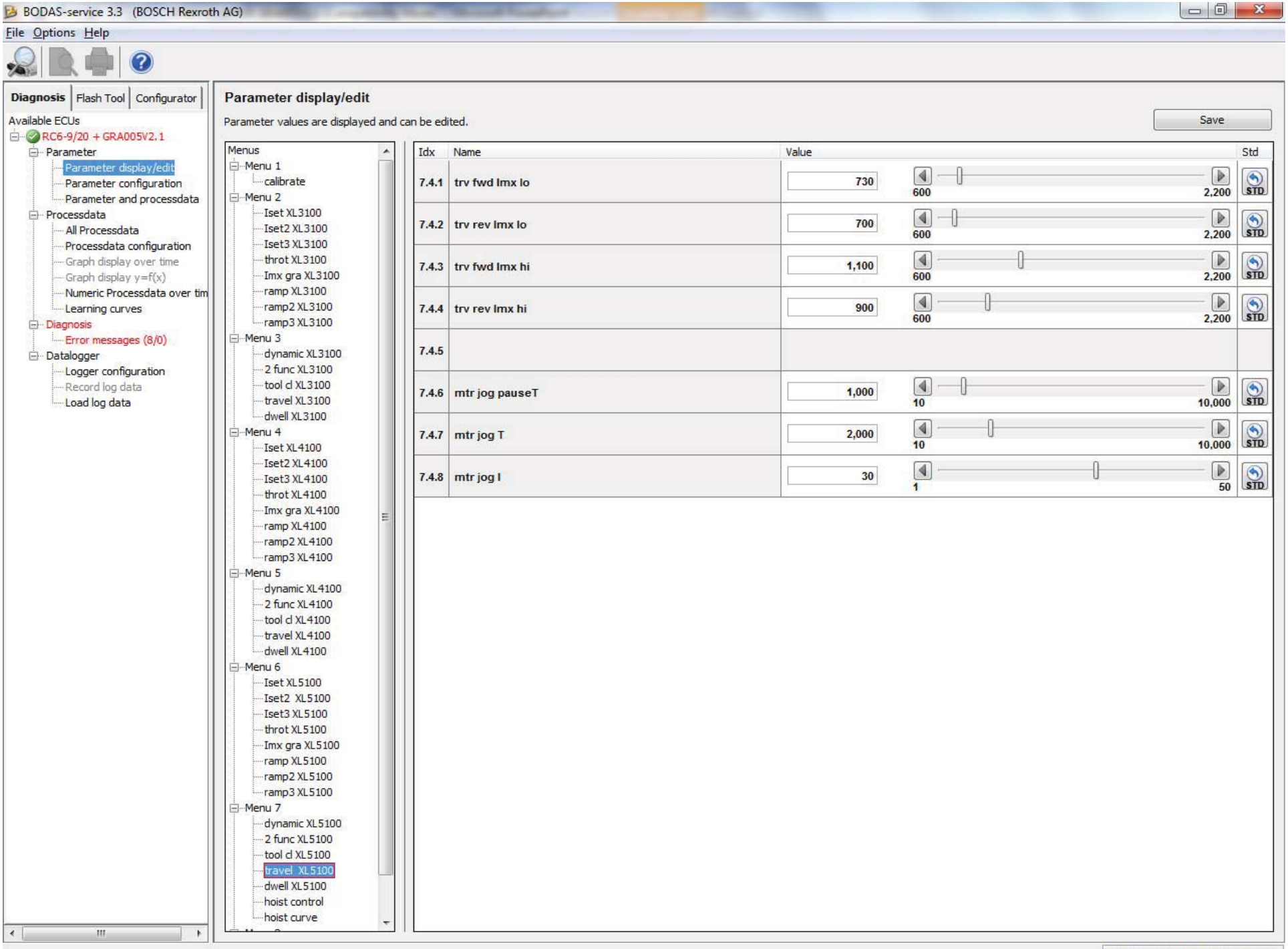

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Menu 2
Iset XL3100
Iset2 XL3100
Iset3 XL3100
throt XL3100
Imx gra XL3100
ramp XL3100
ramp2 XL3100
ramp3 XL3100
Menu 3
dynamic XL3100
2 func XL3100
tool cl XL3100
travel XL3100
dwell XL3100
Menu 4
Iset XL4100
Iset2 XL4100
Iset3 XL4100
throt XL4100
Imx gra XL4100
ramp XL4100
ramp2 XL4100
ramp3 XL4100
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2 func XL4100
tool cl XL4100
travel XL4100
dwell XL4100
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Iset XL5100
Iset2 XL5100
Iset3 XL5100
throt XL5100
Imx gra XL5100
ramp XL5100
ramp2 XL5100
ramp3 XL5100
Menu 7
dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
6.7.1 tool open Acc 300 1 10,000 STD
6.7.2 tool open Dec 300 1 10,000 STD
6.7.3 tool close Acc 300 1 10,000 STD
6.7.4 tool close Dec 300 1 10,000 STD
6.7.5 propel fwd Acc 500 1 10,000 STD
6.7.6 propel fwd Dec 350 1 10,000 STD
6.7.7 propel rev Acc 500 1 10,000 STD
6.7.8 propel rev Dec 350 1 10,000 STD
RC6-9/20 + GRA005V2.1 + COM: 4

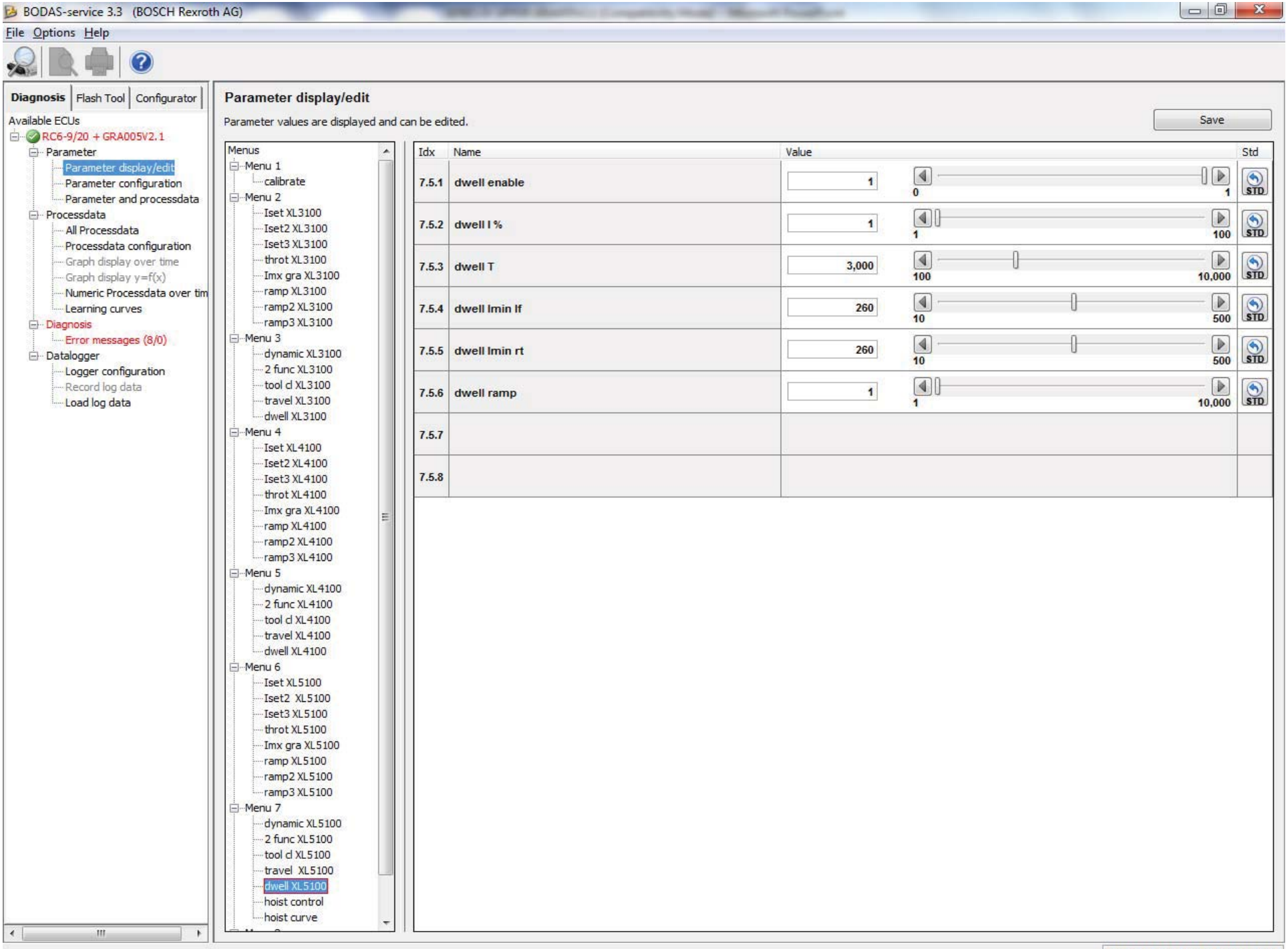

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Menu 2
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Iset2 XL3100
Iset3 XL3100
throt XL3100
Imx gra XL3100
ramp XL3100
ramp2 XL3100
ramp3 XL3100
Menu 3
dynamic XL3100
2 func XL3100
tool cl XL3100
travel XL3100
dwell XL3100
Menu 4
Iset XL4100
Iset2 XL4100
Iset3 XL4100
throt XL4100
Imx gra XL4100
ramp XL4100
ramp2 XL4100
ramp3 XL4100
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dynamic XL4100
2 func XL4100
tool cl XL4100
travel XL4100
dwell XL4100
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Iset XL5100
Iset2 XL5100
Iset3 XL5100
throt XL5100
Imx gra XL5100
ramp XL5100
ramp2 XL5100
ramp3 XL5100
Menu 7
dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
6.8.1 swing rt acc 320 10 10,000 STD
6.8.2 swing rt dec 320 10 10,000 STD
6.8.3 swing lf acc 320 10 10,000 STD
6.8.4 swing lf dec 320 10 10,000 STD
6.8.5
6.8.6
6.8.7
6.8.8
RC6-9/20 + GRA005V2.1 + COM: 4

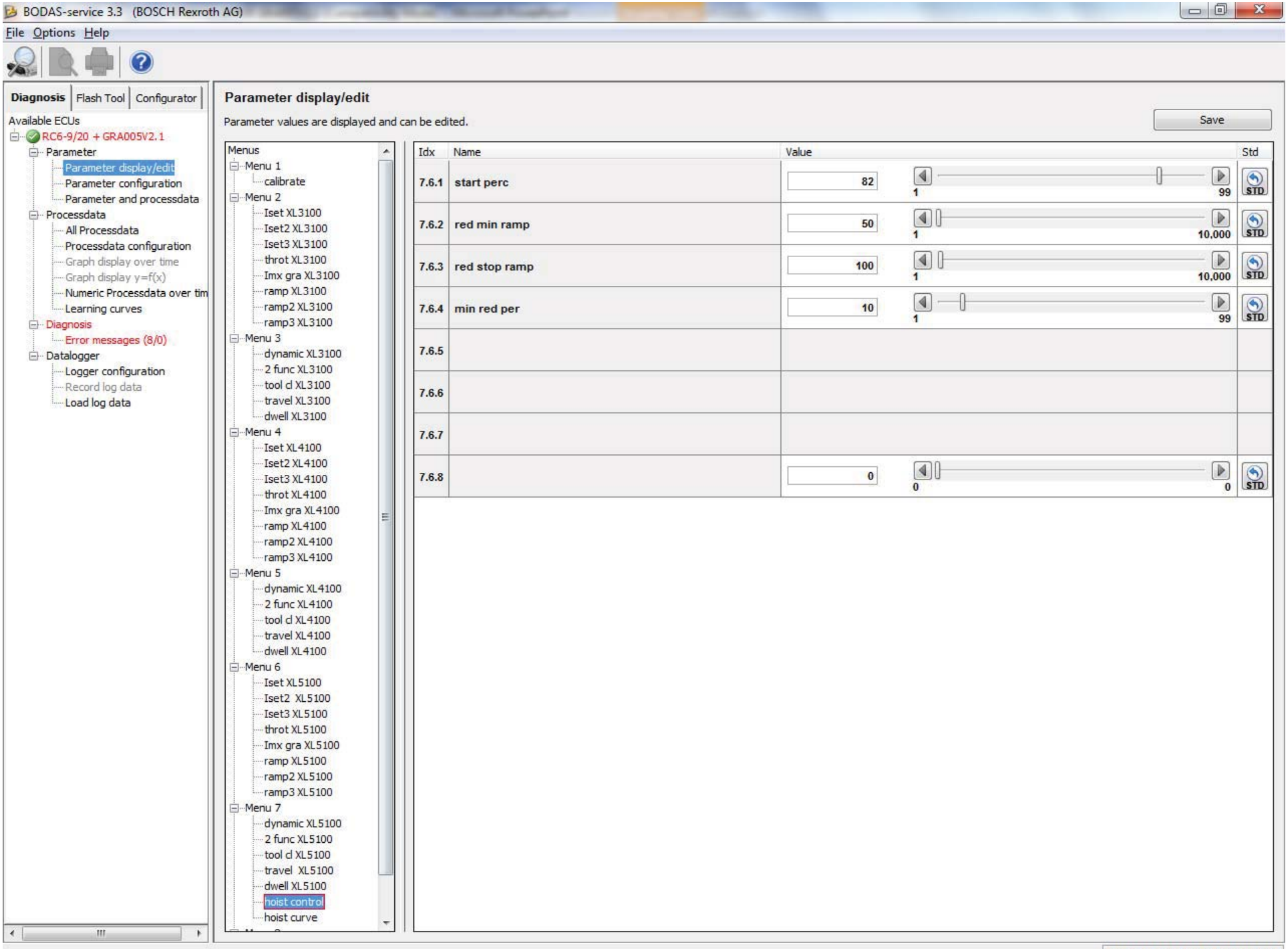

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Iset2 XL3100
Iset3 XL3100
throt XL3100
Imx gra XL3100
ramp XL3100
ramp2 XL3100
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Menu 3
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Menu 4
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Menu 5
dynamic XL4100
2 func XL4100
tool cl XL4100
travel XL4100
dwell XL4100
Menu 6
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Iset2 XL5100
Iset3 XL5100
throt XL5100
Imx gra XL5100
ramp XL5100
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ramp3 XL5100
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dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
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7.1.1
7.1.2
7.1.3
7.1.4
7.1.5
% of mx tool o
99
1
99
STD
7.1.6
ramp tool o
300
1
10,000
STD
7.1.7
% of mx tool c
99
1
99
STD
7.1.8
ramp tool c
300
1
10,000
STD
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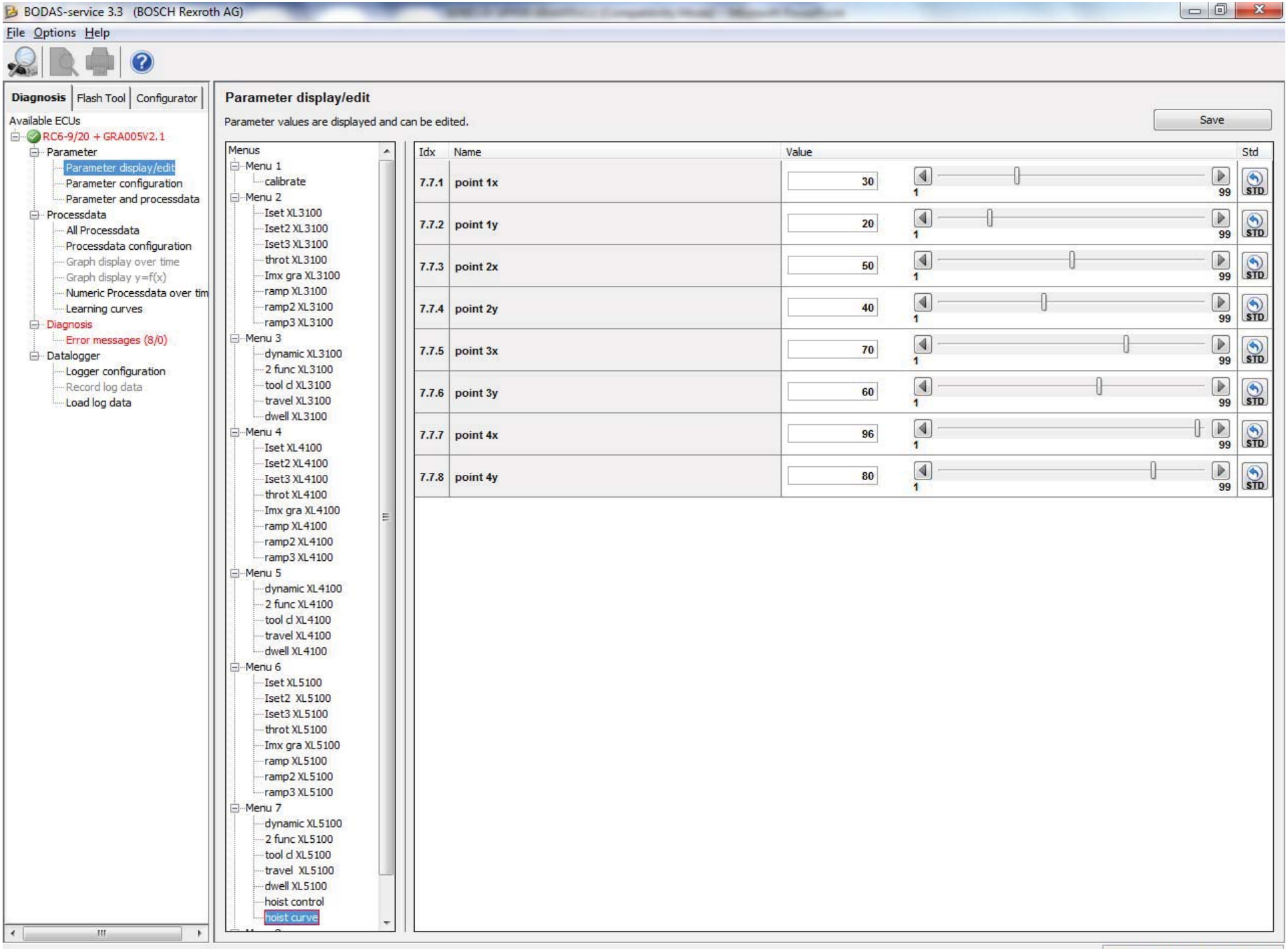

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Iset3 XL4100
throt XL4100
Imx gra XL4100
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Iset3 XL5100
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Imx gra XL5100
ramp XL5100
ramp2 XL5100
ramp3 XL5100
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dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
7.2.1 hoist % 80 1 99 STD
7.2.2 new swing Imx 700 600 2,200 STD
7.2.3 new boom Imx 800 600 2,200 STD
7.2.4 ramp 10 1 500 STD
7.2.5
7.2.6
7.2.7
7.2.8
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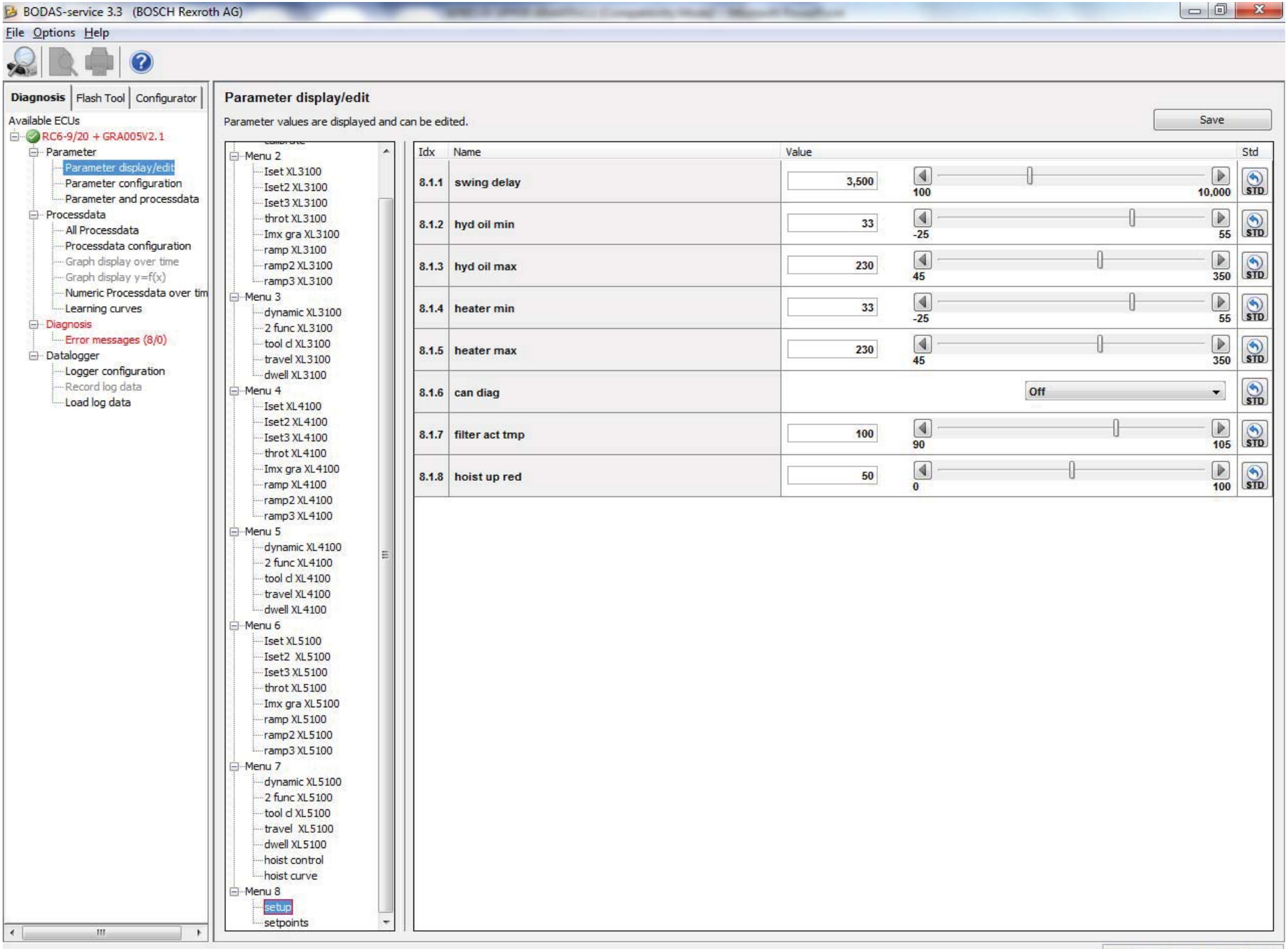

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2 func XL3100
tool cl XL3100
travel XL3100
dwell XL3100
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Iset2 XL4100
Iset3 XL4100
throt XL4100
Imx gra XL4100
ramp XL4100
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ramp3 XL4100
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tool cl XL4100
travel XL4100
dwell XL4100
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Iset3 XL5100
throt XL5100
Imx gra XL5100
ramp XL5100
ramp2 XL5100
ramp3 XL5100
Menu 7
dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
7.3.1 tool open T 4 1 25 STD
7.3.2 tool close T 2 1 25 STD
7.3.3 tool Imax 730 380 750 STD
7.3.4
7.3.5
7.3.6
7.3.7
7.3.8
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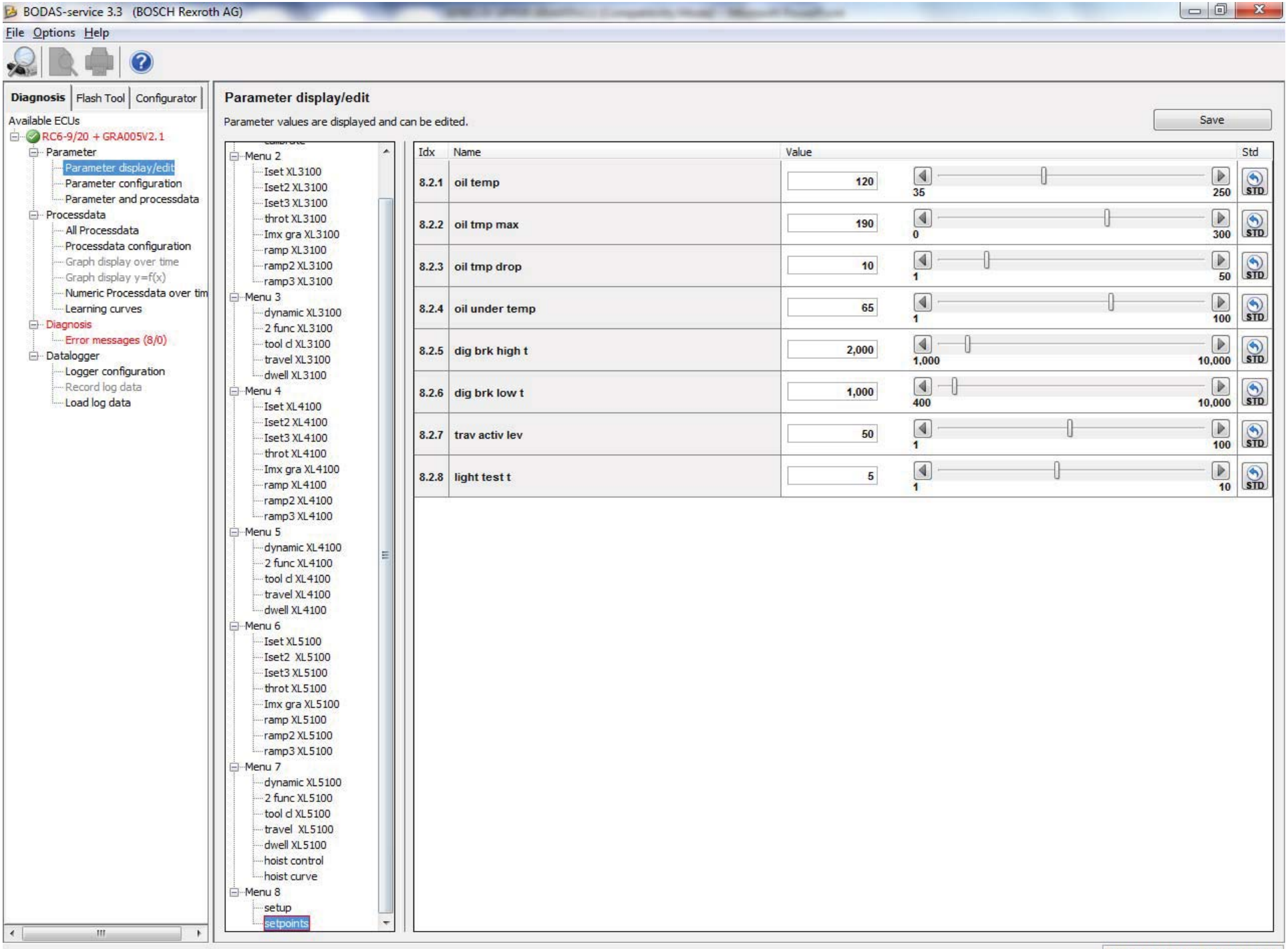

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Imx gra XL5100
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Menu 7
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tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
7.4.1 trv fwd lmx lo 730 600 2,200 STD
7.4.2 trv rev lmx lo 700 600 2,200 STD
7.4.3 trv fwd lmx hi 1,100 600 2,200 STD
7.4.4 trv rev lmx hi 900 600 2,200 STD
7.4.5
7.4.6 mtr jog pauseT 1,000 10 10,000 STD
7.4.7 mtr jog T 2,000 10 10,000 STD
7.4.8 mtr jog I 30 1 50 STD
RC6-9/20 + GRA005V2.1 + COM: 4

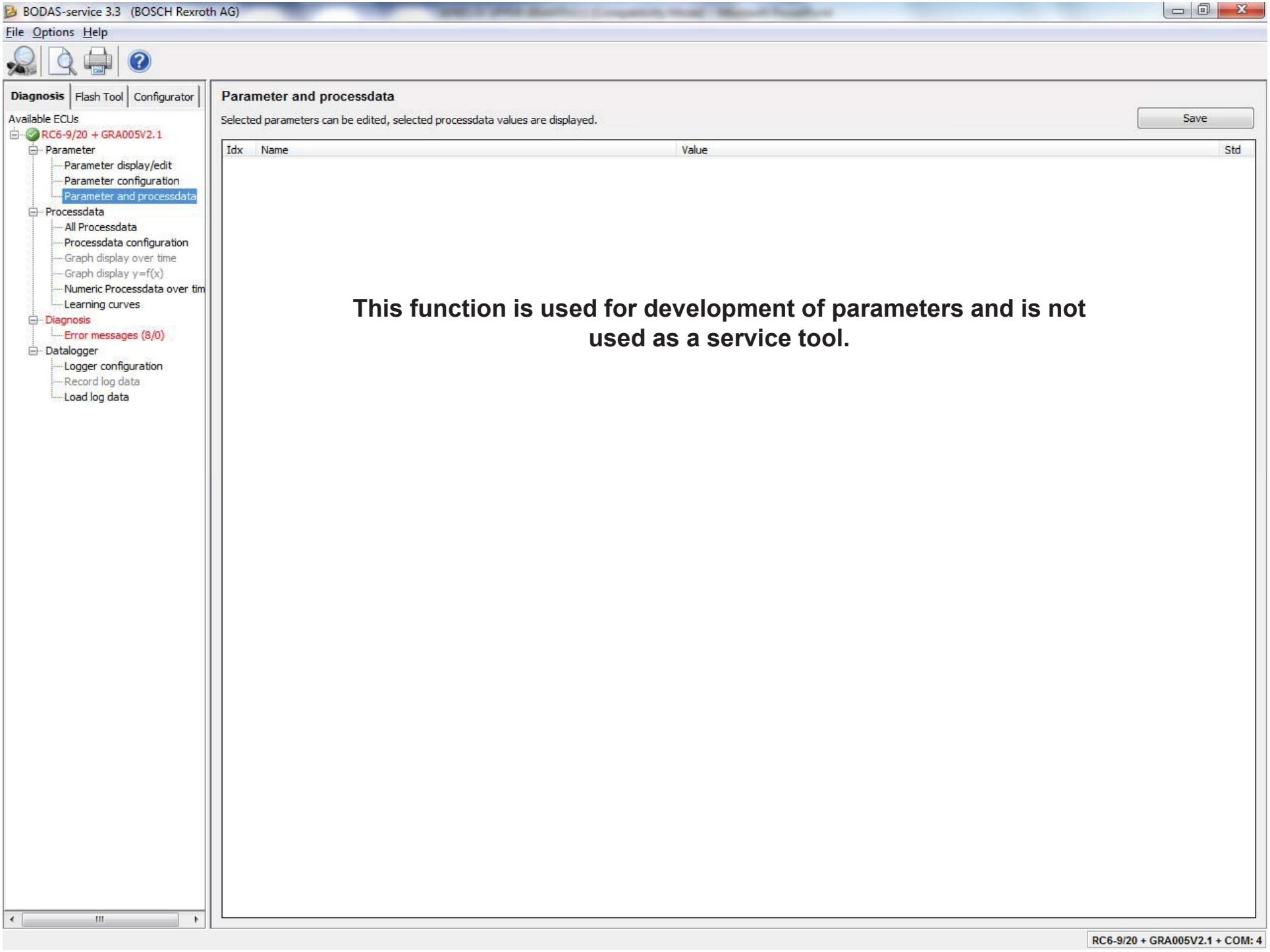

BODAS-service 3.3 (BOSCH Rexroth AG)
File Options Help
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All Processdata
Processdata configuration
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Graph display y=f(x)
Numeric Processdata over tim
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Datalogger
Logger configuration
Record log data
Load log data
Parameter display/edit
Parameter values are displayed and can be edited.
Save
Menus
Menu 1
calibrate
Menu 2
Iset XL3100
Iset2 XL3100
Iset3 XL3100
throt XL3100
Imx gra XL3100
ramp XL3100
ramp2 XL3100
ramp3 XL3100
Menu 3
dynamic XL3100
2 func XL3100
tool cl XL3100
travel XL3100
dwell XL3100
Menu 4
Iset XL4100
Iset2 XL4100
Iset3 XL4100
throt XL4100
Imx gra XL4100
ramp XL4100
ramp2 XL4100
ramp3 XL4100
Menu 5
dynamic XL4100
2 func XL4100
tool cl XL4100
travel XL4100
dwell XL4100
Menu 6
Iset XL5100
Iset2 XL5100
Iset3 XL5100
throt XL5100
Imx gra XL5100
ramp XL5100
ramp2 XL5100
ramp3 XL5100
Menu 7
dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
7.5.1 dwell enable 1 0 1 STD
7.5.2 dwell I % 1 1 100 STD
7.5.3 dwell T 3,000 100 10,000 STD
7.5.4 dwell Imin lf 260 10 500 STD
7.5.5 dwell Imin rt 260 10 500 STD
7.5.6 dwell ramp 1 1 10,000 STD
7.5.7
7.5.8
RC6-9/20 + GRA005V2.1 + COM: 4

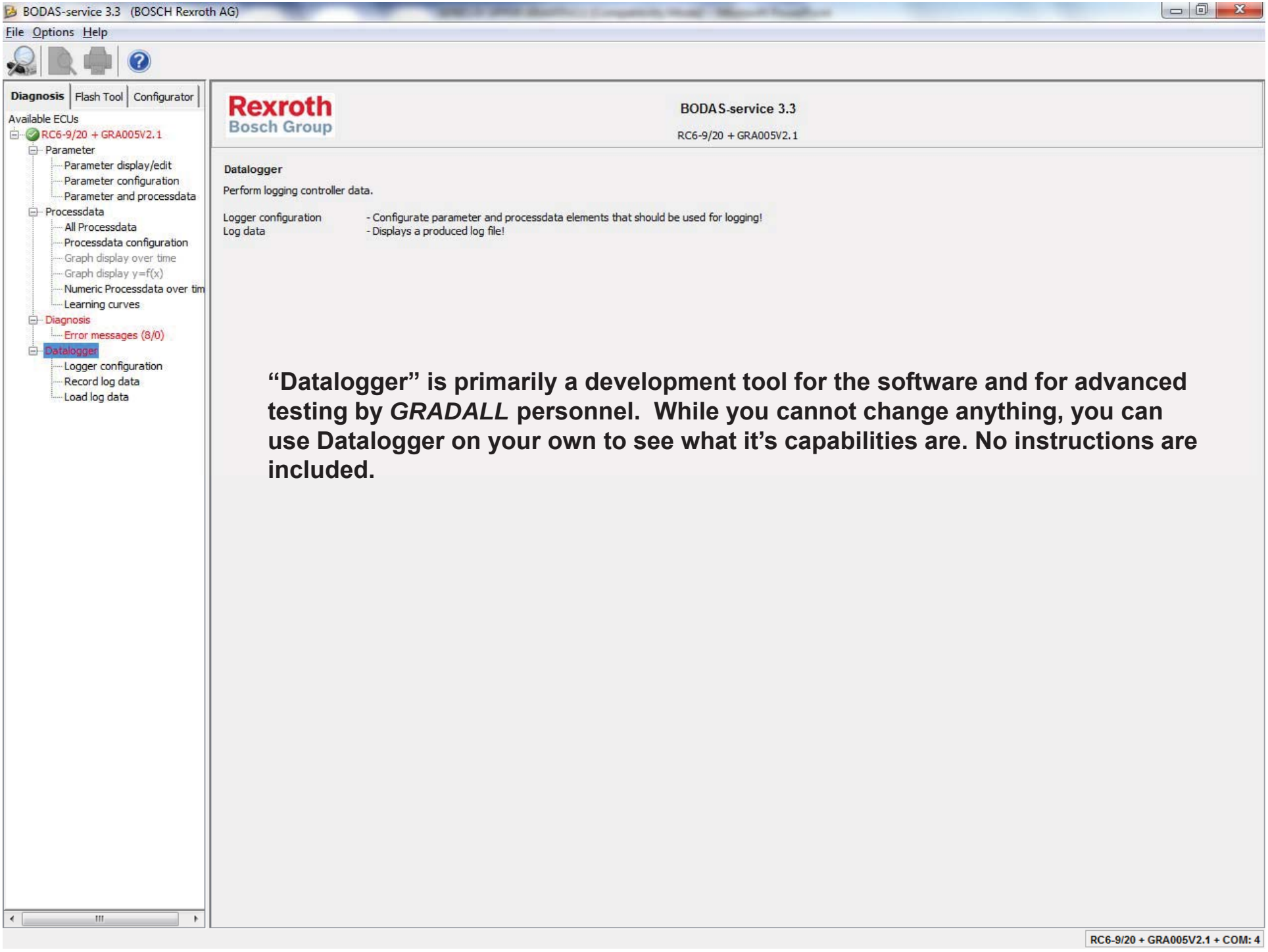

BODAS-service 3.3 (BOSCH Rexroth AG)
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Processdata
All Processdata
Processdata configuration
Graph display over time
Graph display y=f(x)
Numeric Processdata over tim
Learning curves
Diagnosis
Error messages (8/0)
Datalogger
Logger configuration
Record log data
Load log data
Parameter display/edit
Parameter values are displayed and can be edited.
Save
Menus
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calibrate
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Iset2 XL3100
Iset3 XL3100
throt XL3100
Imx gra XL3100
ramp XL3100
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2 func XL3100
tool cl XL3100
travel XL3100
dwell XL3100
Menu 4
Iset XL4100
Iset2 XL4100
Iset3 XL4100
throt XL4100
Imx gra XL4100
ramp XL4100
ramp2 XL4100
ramp3 XL4100
Menu 5
dynamic XL4100
2 func XL4100
tool cl XL4100
travel XL4100
dwell XL4100
Menu 6
Iset XL5100
Iset2 XL5100
Iset3 XL5100
throt XL5100
Imx gra XL5100
ramp XL5100
ramp2 XL5100
ramp3 XL5100
Menu 7
dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
7.6.1 start perc 82 1 99 STD
7.6.2 red min ramp 50 1 10,000 STD
7.6.3 red stop ramp 100 1 10,000 STD
7.6.4 min red per 10 1 99 STD
7.6.5
7.6.6
7.6.7
7.6.8 0 0 0 STD
RC6-9/20 + GRA005V2.1 + COM: 4


BODAS-service 3.3 (BOSCH Rexroth AG)
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Numeric Processdata over tim
Learning curves
Diagnosis
Error messages (8/0)
Datalogger
Logger configuration
Record log data
Load log data
Parameter display/edit
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Save
Menus
Menu 1
calibrate
Menu 2
Iset XL3100
Iset2 XL3100
Iset3 XL3100
throt XL3100
Imx gra XL3100
ramp XL3100
ramp2 XL3100
ramp3 XL3100
Menu 3
dynamic XL3100
2 func XL3100
tool cl XL3100
travel XL3100
dwell XL3100
Menu 4
Iset XL4100
Iset2 XL4100
Iset3 XL4100
throt XL4100
Imx gra XL4100
ramp XL4100
ramp2 XL4100
ramp3 XL4100
Menu 5
dynamic XL4100
2 func XL4100
tool cl XL4100
travel XL4100
dwell XL4100
Menu 6
Iset XL5100
Iset2 XL5100
Iset3 XL5100
throt XL5100
Imx gra XL5100
ramp XL5100
ramp2 XL5100
ramp3 XL5100
Menu 7
dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Idx
Name
Value
Std
7.7.1 point 1x 30 1 99 STD
7.7.2 point 1y 20 1 99 STD
7.7.3 point 2x 50 1 99 STD
7.7.4 point 2y 40 1 99 STD
7.7.5 point 3x 70 1 99 STD
7.7.6 point 3y 60 1 99 STD
7.7.7 point 4x 96 1 99 STD
7.7.8 point 4y 80 1 99 STD
RC6-9/20 + GRA005V2.1 + COM: 4

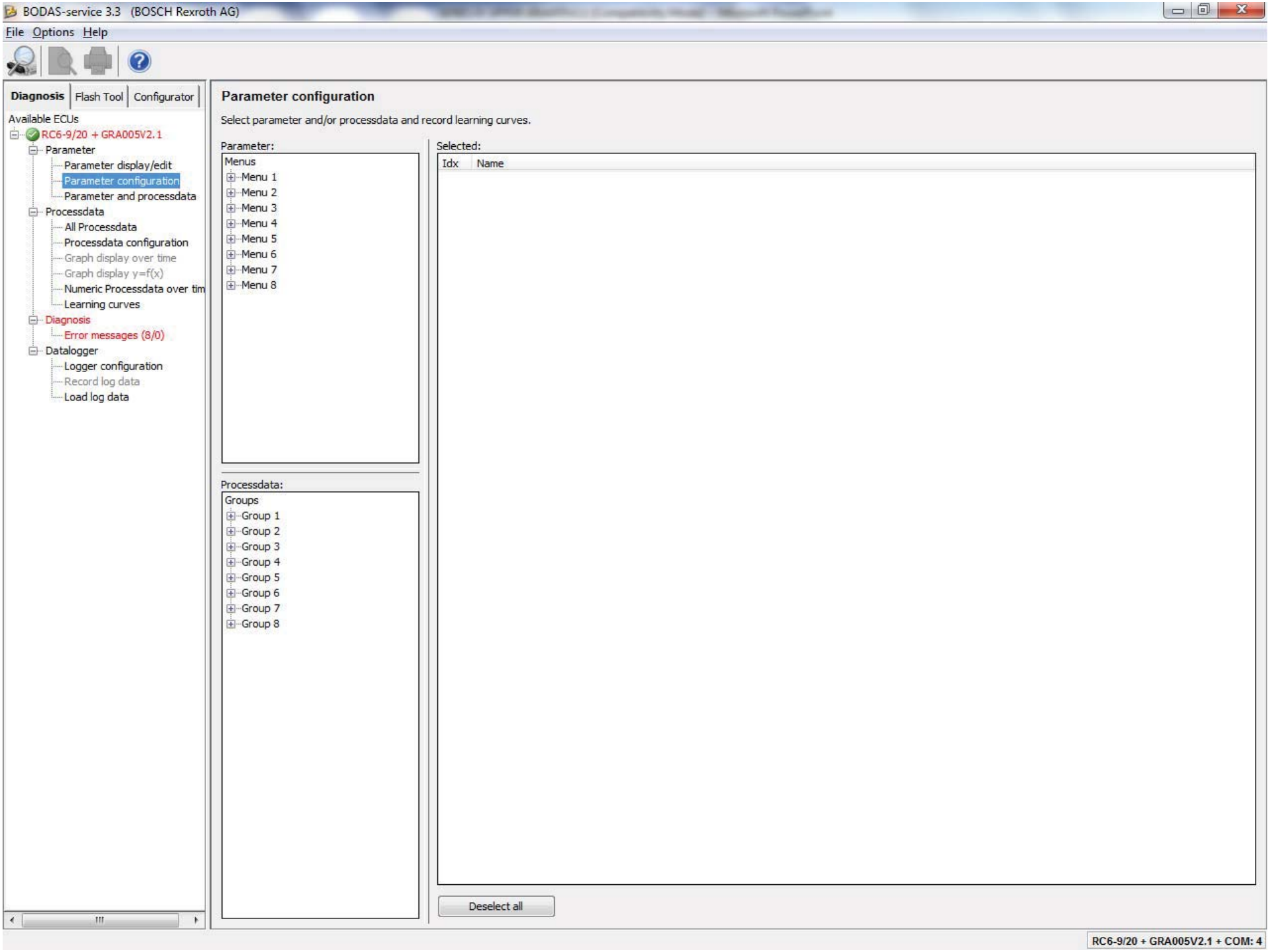

BODAS-service 3.3 (BOSCH Rexroth AG)
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Parameter
Parameter display/edit
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Parameter and processdata
Processdata
All Processdata
Processdata configuration
Graph display over time
Graph display y=f(x)
Numeric Processdata over tim
Learning curves
Diagnosis
Error messages (8/0)
Datalogger
Logger configuration
Record log data
Load log data
Parameter display/edit
Parameter values are displayed and can be edited.
Save
Menu 2
Iset XL3100
Iset2 XL3100
Iset3 XL3100
throt XL3100
Imx gra XL3100
ramp XL3100
ramp2 XL3100
ramp3 XL3100
Menu 3
dynamic XL3100
2 func XL3100
tool cl XL3100
travel XL3100
dwell XL3100
Menu 4
Iset XL4100
Iset2 XL4100
Iset3 XL4100
throt XL4100
Imx gra XL4100
ramp XL4100
ramp2 XL4100
ramp3 XL4100
Menu 5
dynamic XL4100
2 func XL4100
tool cl XL4100
travel XL4100
dwell XL4100
Menu 6
Iset XL5100
Iset2 XL5100
Iset3 XL5100
throt XL5100
Imx gra XL5100
ramp XL5100
ramp2 XL5100
ramp3 XL5100
Menu 7
dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Menu 8
setup
setpoints
Idx
Name
Value
Std
8.1.1 swing delay 3,500 100 10,000 STD
8.1.2 hyd oil min 33 -25 55 STD
8.1.3 hyd oil max 230 45 350 STD
8.1.4 heater min 33 -25 55 STD
8.1.5 heater max 230 45 350 STD
8.1.6 can diag Off STD
8.1.7 filter act tmp 100 90 105 STD
8.1.8 hoist up red 50 0 100 STD
RC6-9/20 + GRA005V2.1 + COM: 4

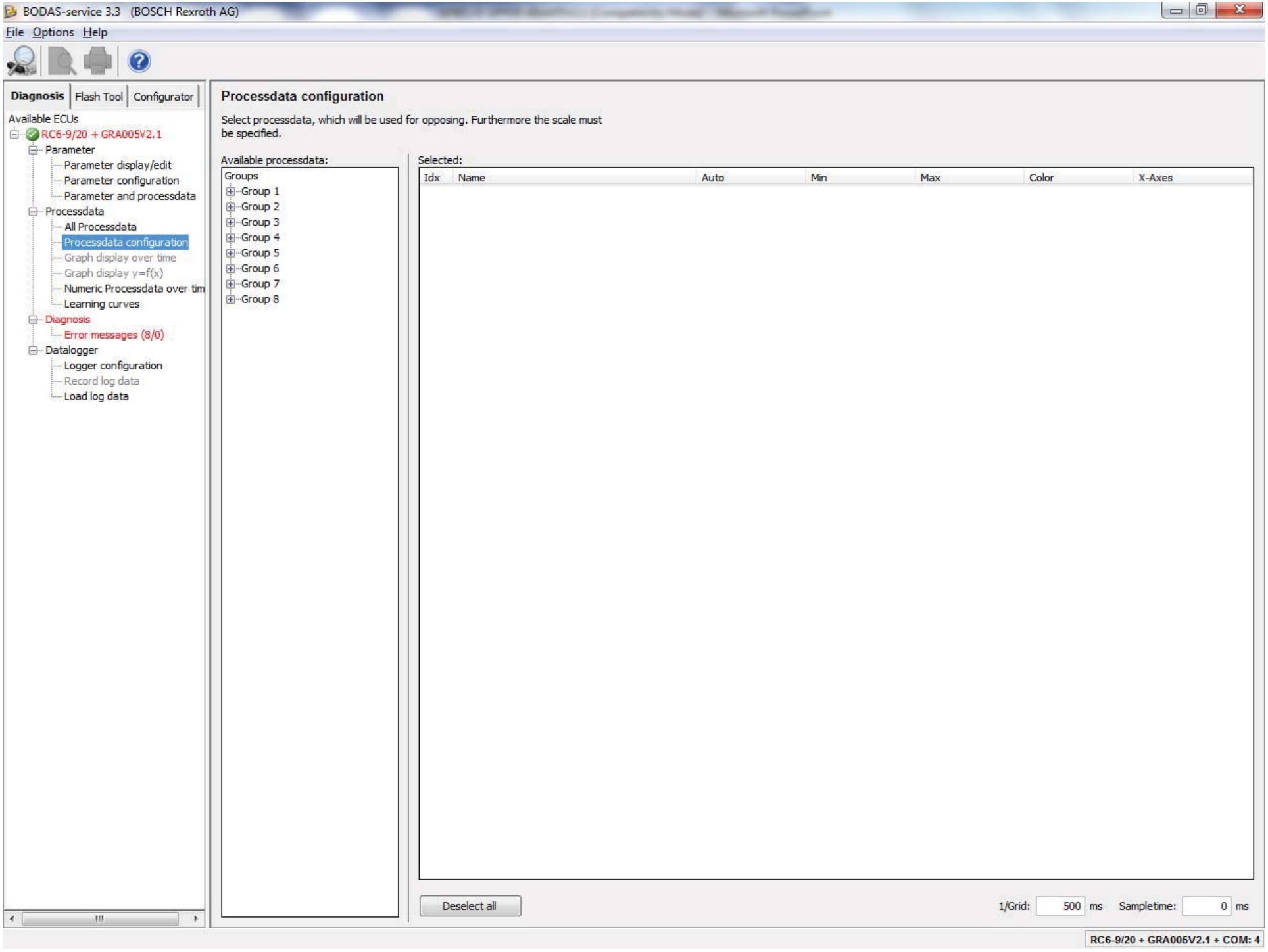

BODAS-service 3.3 (BOSCH Rexroth AG)
File Options Help
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RC6-9/20 + GRA005V2.1
Parameter
Parameter display/edit
Parameter configuration
Parameter and processdata
Processdata
All Processdata
Processdata configuration
Graph display over time
Graph display y=f(x)
Numeric Processdata over tim
Learning curves
Diagnosis
Error messages (8/0)
Datalogger
Logger configuration
Record log data
Load log data
Parameter display/edit
Parameter values are displayed and can be edited.
Save
Menu 2
Iset XL3100
Iset2 XL3100
Iset3 XL3100
throt XL3100
Imx gra XL3100
ramp XL3100
ramp2 XL3100
ramp3 XL3100
Menu 3
dynamic XL3100
2 func XL3100
tool cl XL3100
travel XL3100
dwell XL3100
Menu 4
Iset XL4100
Iset2 XL4100
Iset3 XL4100
throt XL4100
Imx gra XL4100
ramp XL4100
ramp2 XL4100
ramp3 XL4100
Menu 5
dynamic XL4100
2 func XL4100
tool cl XL4100
travel XL4100
dwell XL4100
Menu 6
Iset XL5100
Iset2 XL5100
Iset3 XL5100
throt XL5100
Imx gra XL5100
ramp XL5100
ramp2 XL5100
ramp3 XL5100
Menu 7
dynamic XL5100
2 func XL5100
tool cl XL5100
travel XL5100
dwell XL5100
hoist control
hoist curve
Menu 8
setup
setpoints
Idx
Name
Value
Std
8.2.1 oil temp 120 35 250 STD
8.2.2 oil tmp max 190 0 300 STD
8.2.3 oil tmp drop 10 1 50 STD
8.2.4 oil under temp 65 1 100 STD
8.2.5 dig brk high t 2,000 1,000 10,000 STD
8.2.6 dig brk low t 1,000 400 10,000 STD
8.2.7 trav activ lev 50 1 100 STD
8.2.8 light test t 5 1 10 STD
RC6-9/20 + GRA005V2.1 + COM: 4

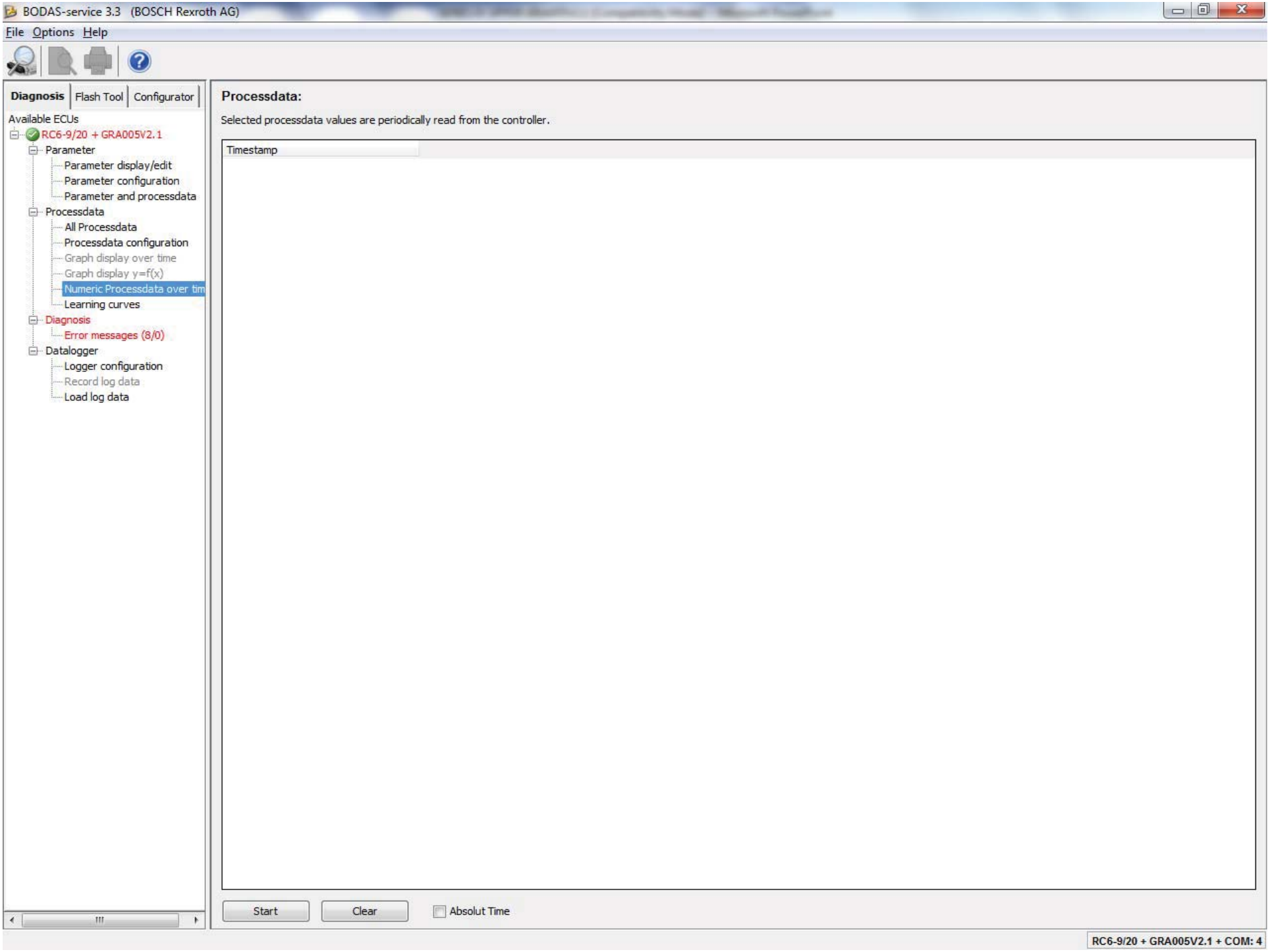

BODAS-service 3.3 (BOSCH Rexroth AG)
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Available ECUs
RC6-9/20 + GRA005V2.1
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Parameter display/edit
Parameter configuration
Parameter and processdata
Processdata
All Processdata
Processdata configuration
Graph display over time
Graph display y=f(x)
Numeric Processdata over tim
Learning curves
Diagnosis
Error messages (8/0)
Datalogger
Logger configuration
Record log data
Load log data
Parameter and processdata
Selected parameters can be edited, selected processdata values are displayed.
Save
Idx
Name
Value
Std
This function is used for development of parameters and is not used as a service tool.
RC6-9/20 + GRA005V2.1 + COM: 4

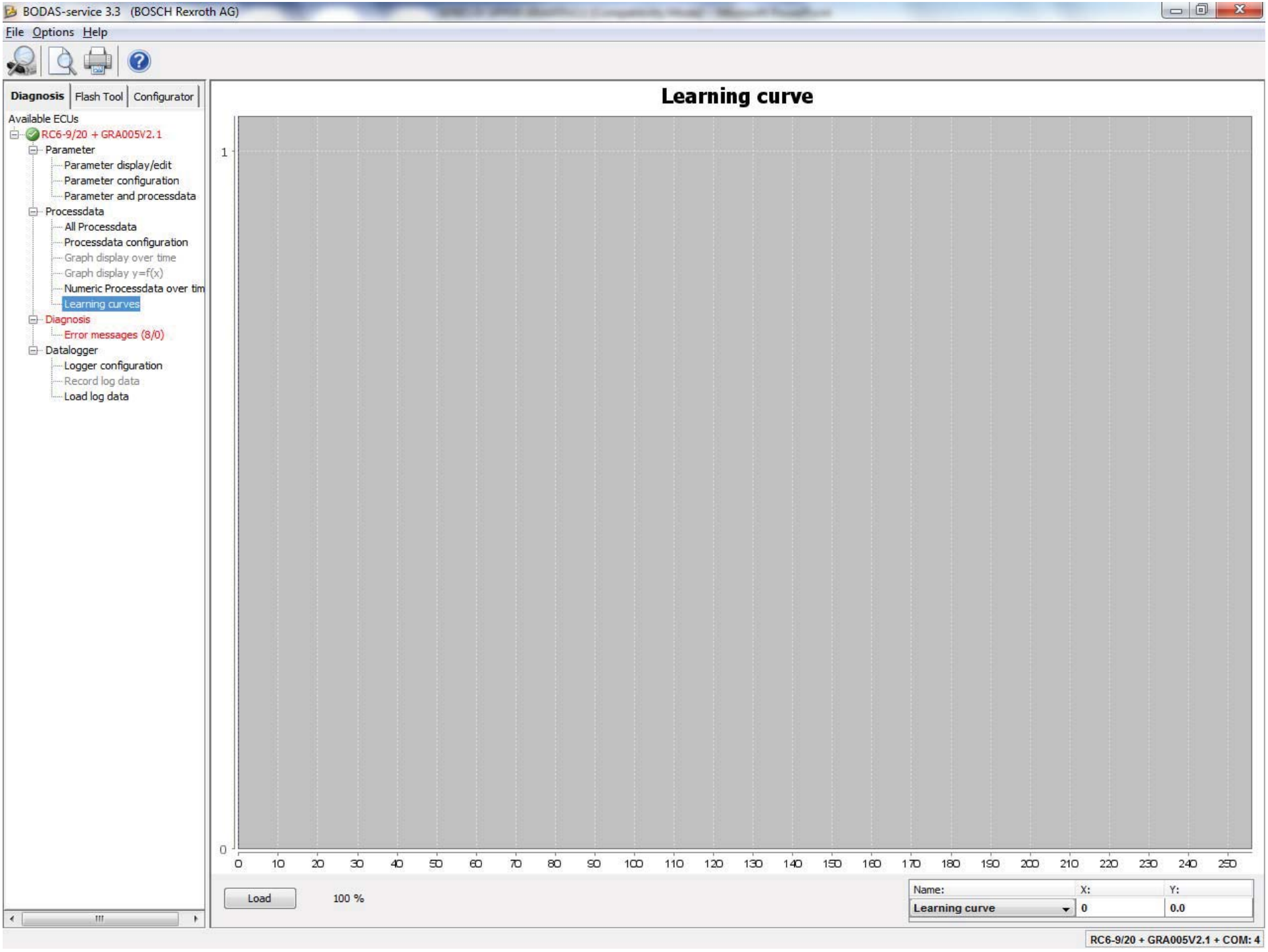


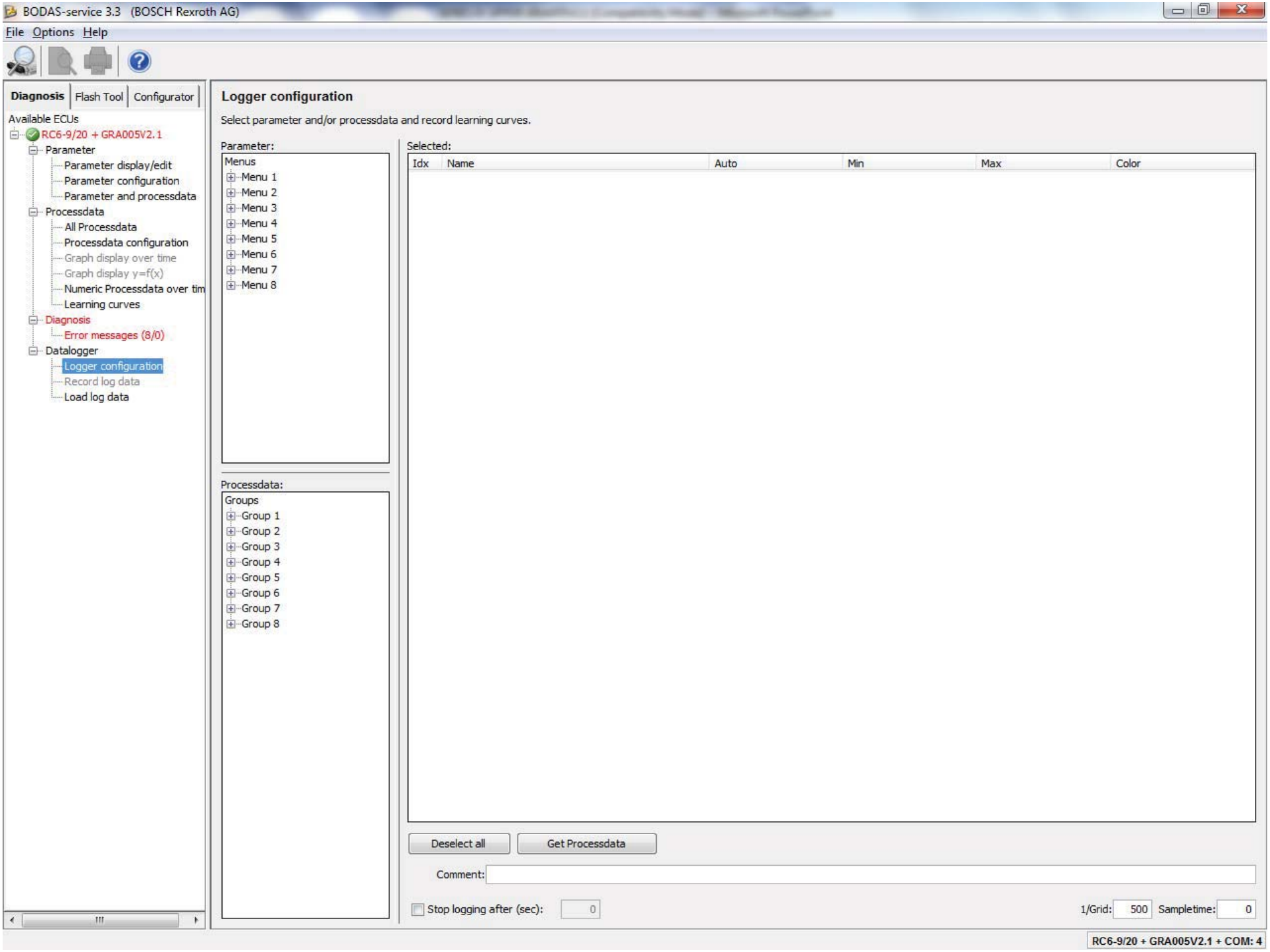
“Datalogger” is primarily a development tool for the software and for advanced testing by *GRADALL* personnel. While you cannot change anything, you can use Datalogger on your own to see what it’s capabilities are. No instructions are included.

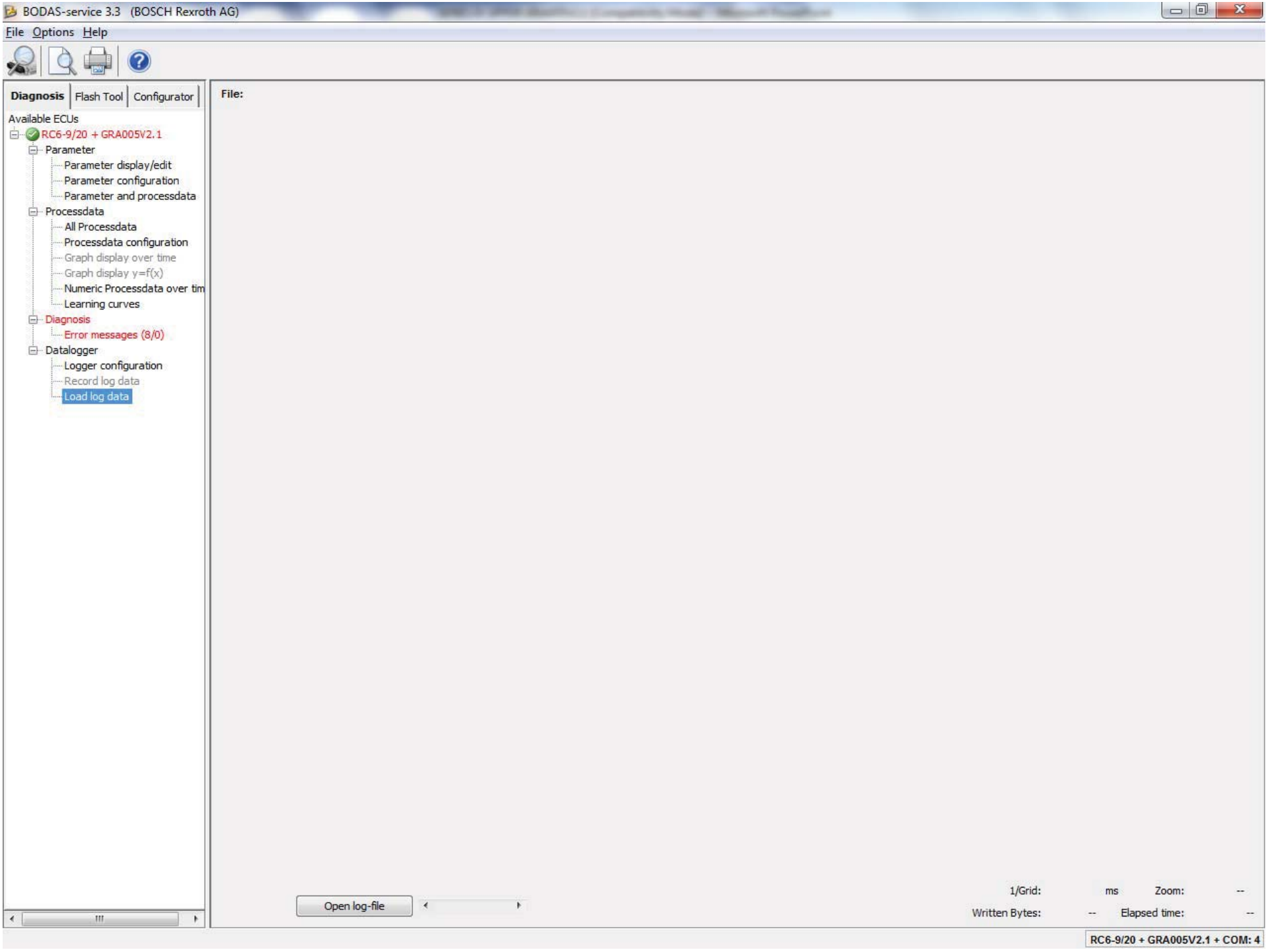

BODAS-service 3.3 (BOSCH Rexroth AG)
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Available ECUs
RC6-9/20 + GRA005V2.1
Parameter
Parameter display/edit
Parameter configuration
Parameter and processdata
Processdata
All Processdata
Processdata configuration
Graph display over time
Graph display y=f(x)
Numeric Processdata over tim
Learning curves
Diagnosis
Error messages (8/0)
Datalogger
Logger configuration
Record log data
Load log data
Parameter configuration
Select parameter and/or processdata and record learning curves.
Parameter:
Menus
Menu 1
Menu 2
Menu 3
Menu 4
Menu 5
Menu 6
Menu 7
Menu 8
Processdata:
Groups
Group 1
Group 2
Group 3
Group 4
Group 5
Group 6
Group 7
Group 8
Selected:
Idx
Name
Deselect all
RC6-9/20 + GRA005V2.1 + COM: 4

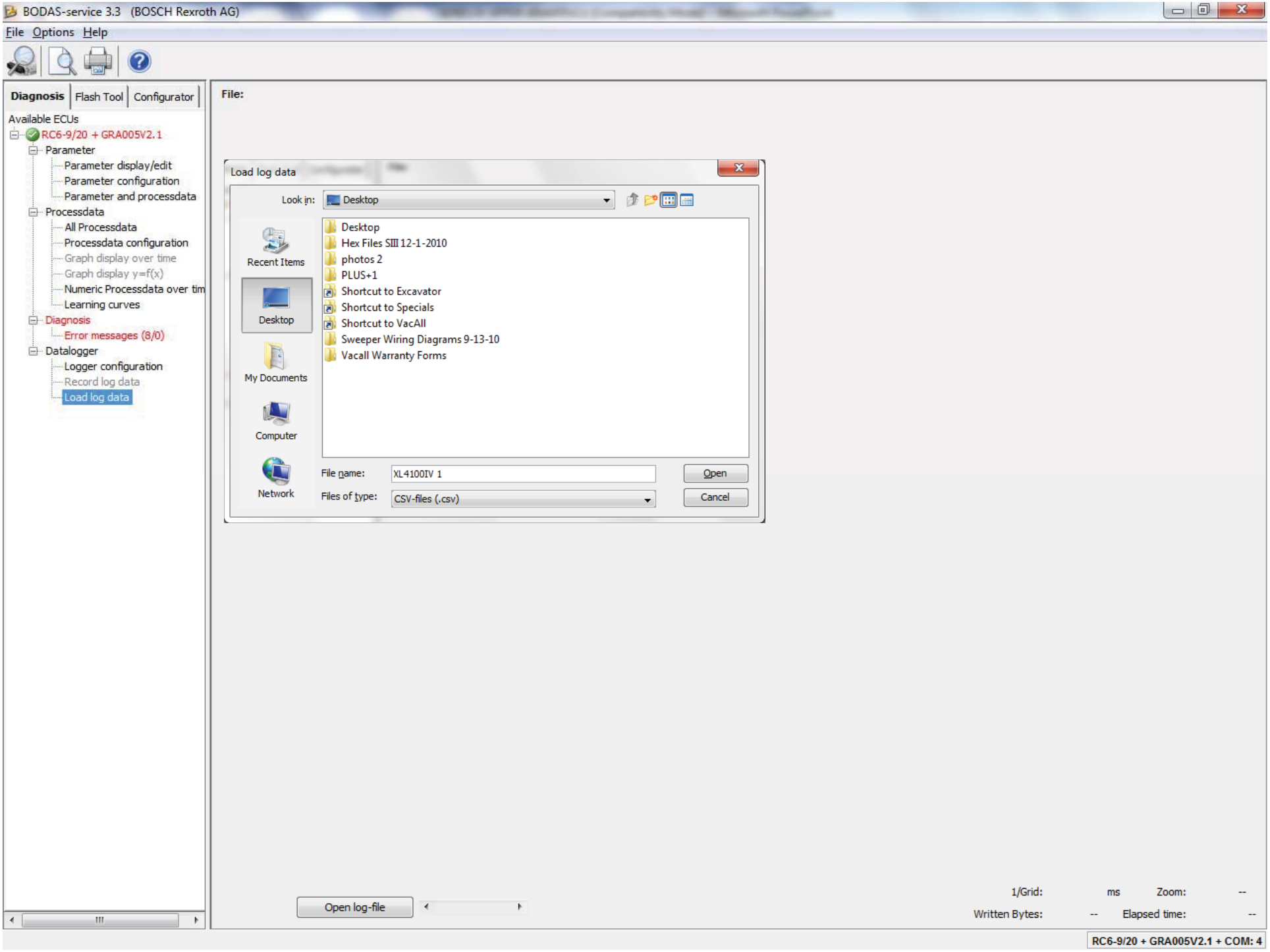

BODAS-service 3.3 (BOSCH Rexroth AG)
File Options Help
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Configurator
Available ECUs
RC6-9/20 + GRA005V2.1
Parameter
Parameter display/edit
Parameter configuration
Parameter and processdata
Processdata
All Processdata
Processdata configuration
Graph display over time
Graph display y=f(x)
Numeric Processdata over tim
Learning curves
Diagnosis
Error messages (8/0)
Datalogger
Logger configuration
Record log data
Load log data
Processdata configuration
Select processdata, which will be used for opposing. Furthermore the scale must be specified.
Available processdata:
Groups
Group 1
Group 2
Group 3
Group 4
Group 5
Group 6
Group 7
Group 8
Selected:
Idx
Name
Auto
Min
Max
Color
X-Axes
Deselect all
1/Grid:
500
ms
Sampletime:
0
ms
RC6-9/20 + GRA005V2.1 + COM: 4

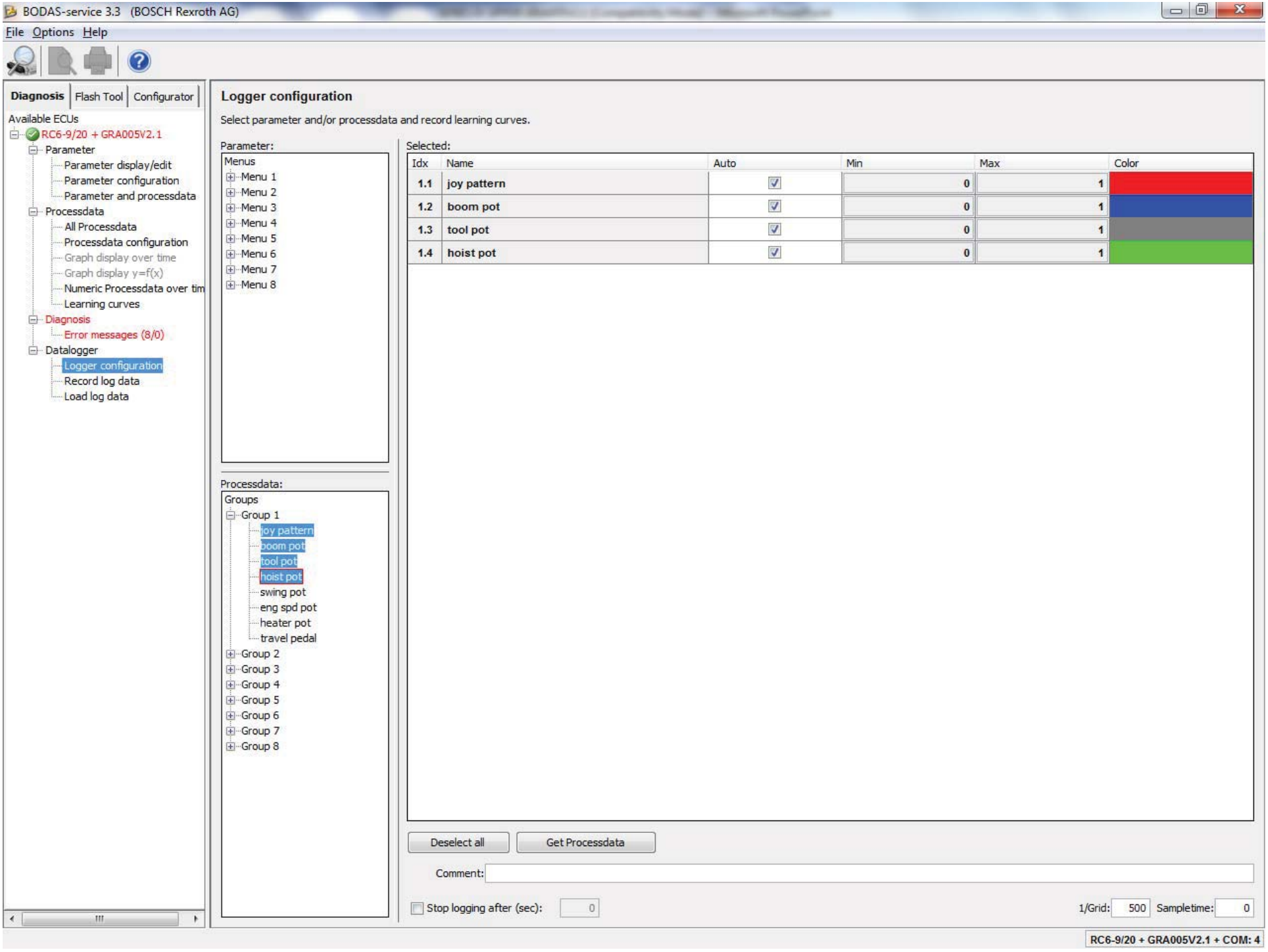

BODAS-service 3.3 (BOSCH Rexroth AG)
File Options Help
Diagnosis
Flash Tool
Configurator
Available ECUs
RC6-9/20 + GRA005V2.1
Parameter
Parameter display/edit
Parameter configuration
Parameter and processdata
Processdata
All Processdata
Processdata configuration
Graph display over time
Graph display y=f(x)
Numeric Processdata over tim
Learning curves
Diagnosis
Error messages (8/0)
Datalogger
Logger configuration
Record log data
Load log data
Processdata:
Selected processdata values are periodically read from the controller.
Timestamp
Start
Clear
Absolut Time
RC6-9/20 + GRA005V2.1 + COM: 4

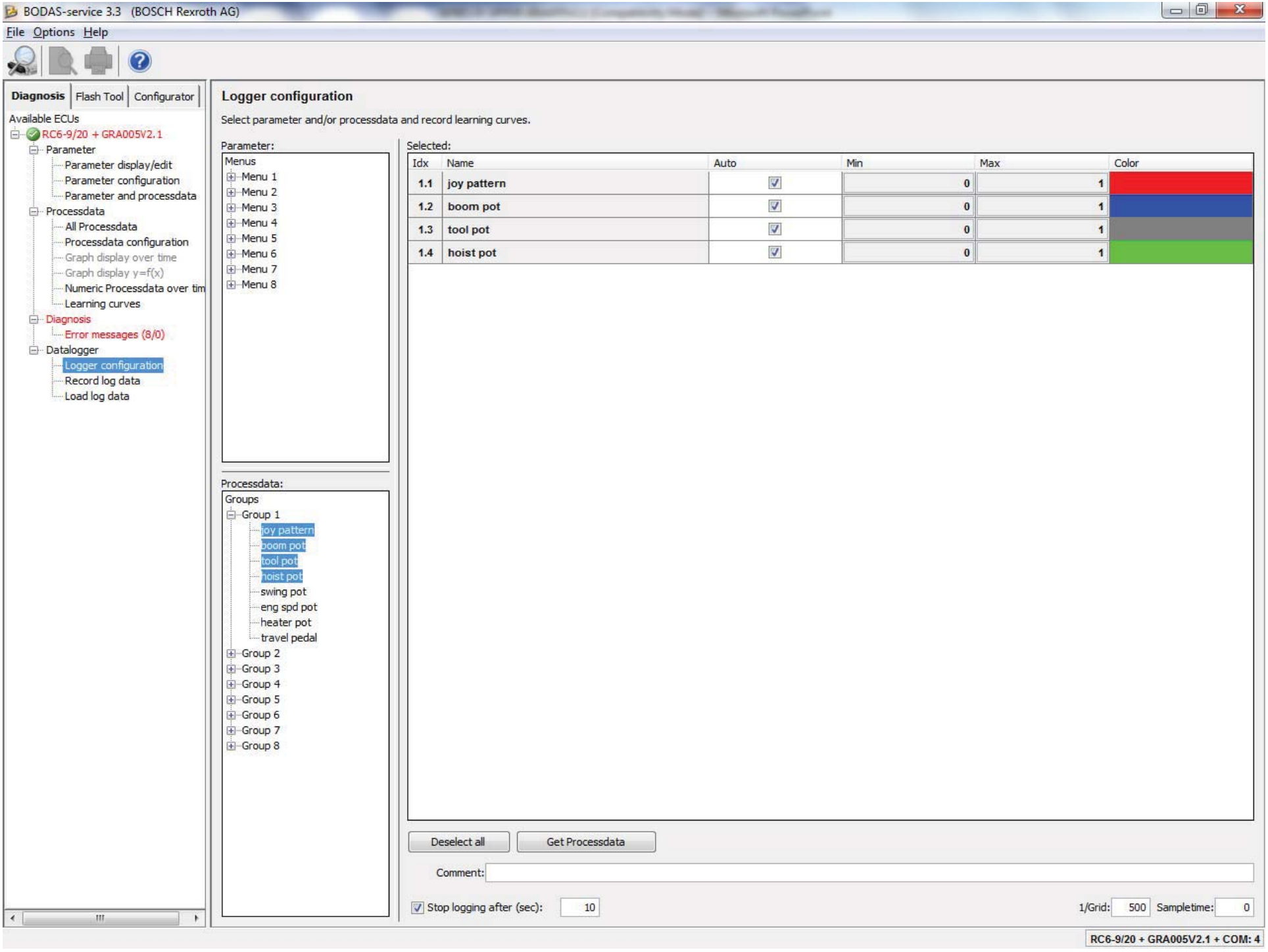

BODAS-service 3.3 (BOSCH Rexroth AG)
File Options Help
Diagnosis
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Available ECUs
RC6-9/20 + GRA005V2.1
Parameter
Parameter display/edit
Parameter configuration
Parameter and processdata
Processdata
All Processdata
Processdata configuration
Graph display over time
Graph display y=f(x)
Numeric Processdata over tim
Learning curves
Diagnosis
Error messages (8/0)
Datalogger
Logger configuration
Record log data
Load log data
Learning curve
1
0
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250
Load
100 %
Name:
X:
Y:
Learning curve
0
0.0
RC6-9/20 + GRA005V2.1 + COM: 4

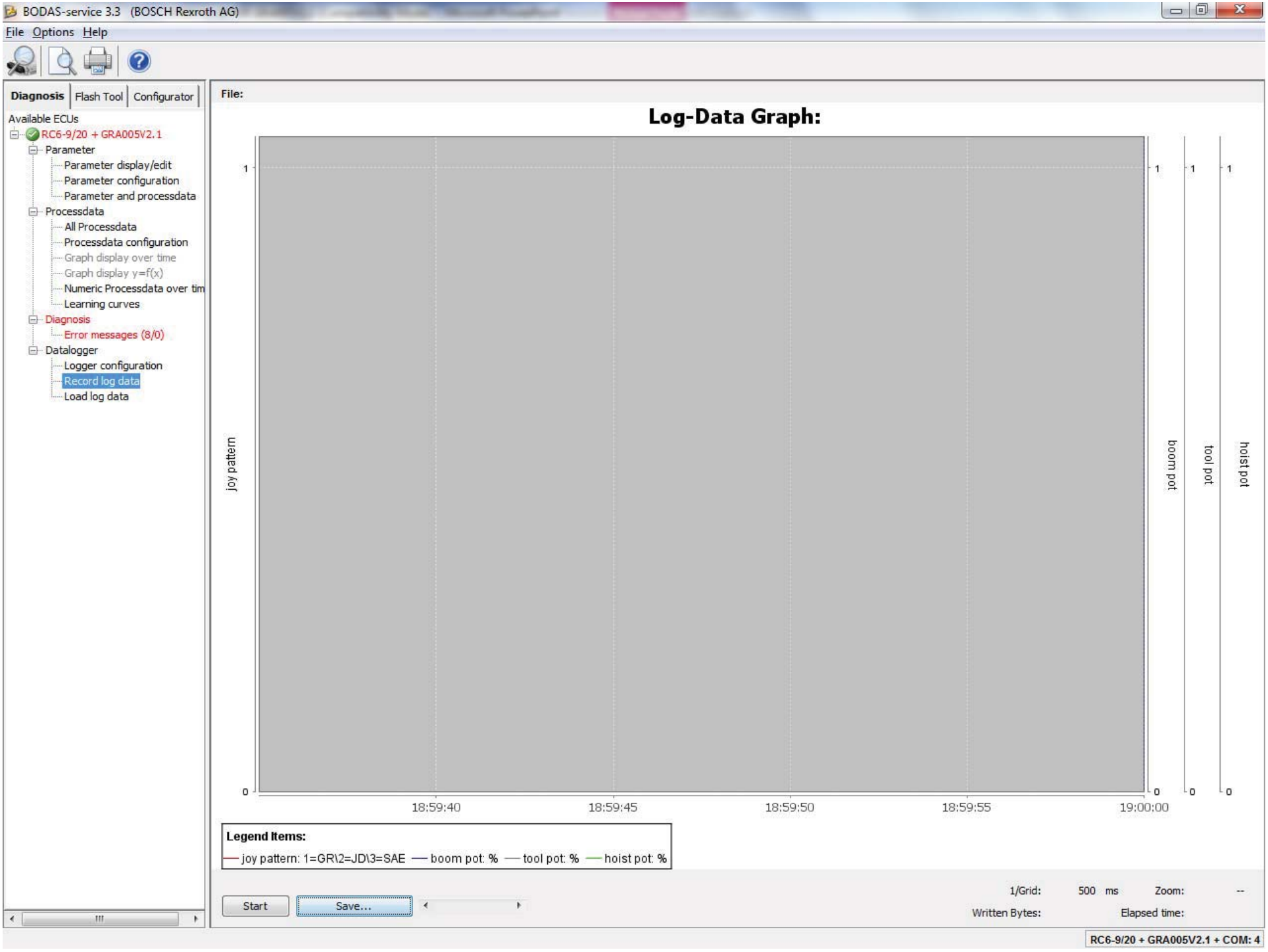

BODAS-service 3.3 (BOSCH Rexroth AG)
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Available ECUs
RC6-9/20 + GRA005V2.1
Parameter
Parameter display/edit
Parameter configuration
Parameter and processdata
Processdata
All Processdata
Processdata configuration
Graph display over time
Graph display y=f(x)
Numeric Processdata over tim
Learning curves
Diagnosis
Error messages (8/0)
Datalogger
Logger configuration
Record log data
Load log data
Logger configuration
Select parameter and/or processdata and record learning curves.
Parameter:
Menus
Menu 1
Menu 2
Menu 3
Menu 4
Menu 5
Menu 6
Menu 7
Menu 8
Processdata:
Groups
Group 1
Group 2
Group 3
Group 4
Group 5
Group 6
Group 7
Group 8
Selected:
Idx
Name
Auto
Min
Max
Color
Deselect all
Get Processdata
Comment:
Stop logging after (sec):
0
1/Grid:
500
Sampletime:
0
RC6-9/20 + GRA005V2.1 + COM: 4

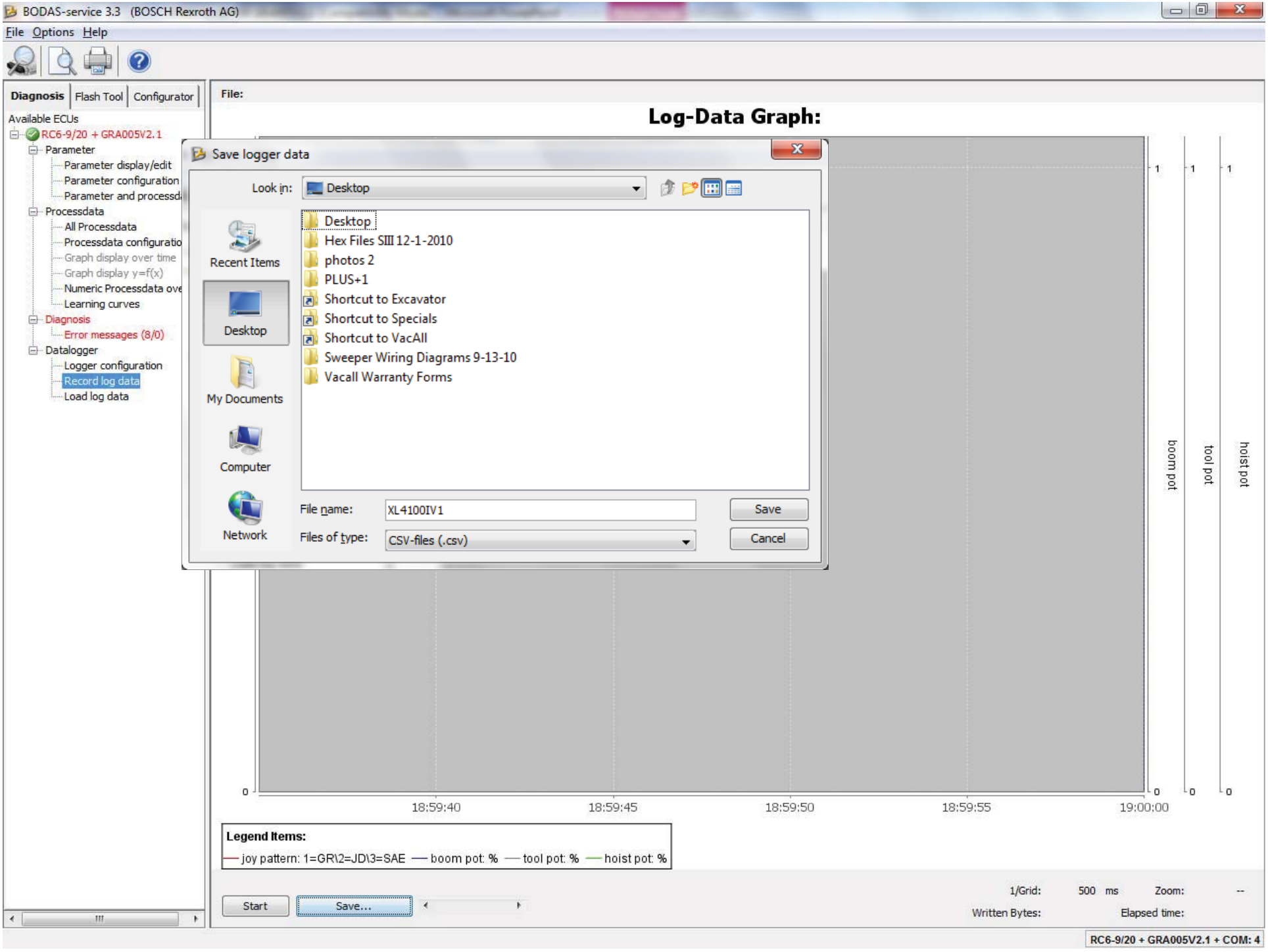

BODAS-service 3.3 (BOSCH Rexroth AG)
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Available ECUs
RC6-9/20 + GRA005V2.1
Parameter
Parameter display/edit
Parameter configuration
Parameter and processdata
Processdata
All Processdata
Processdata configuration
Graph display over time
Graph display y=f(x)
Numeric Processdata over tim
Learning curves
Diagnosis
Error messages (8/0)
Datalogger
Logger configuration
Record log data
Load log data
File:
Open log-file
1/Grid:
ms
Zoom:
Written Bytes:
Elapsed time:
RC6-9/20 + GRA005V2.1 + COM: 4

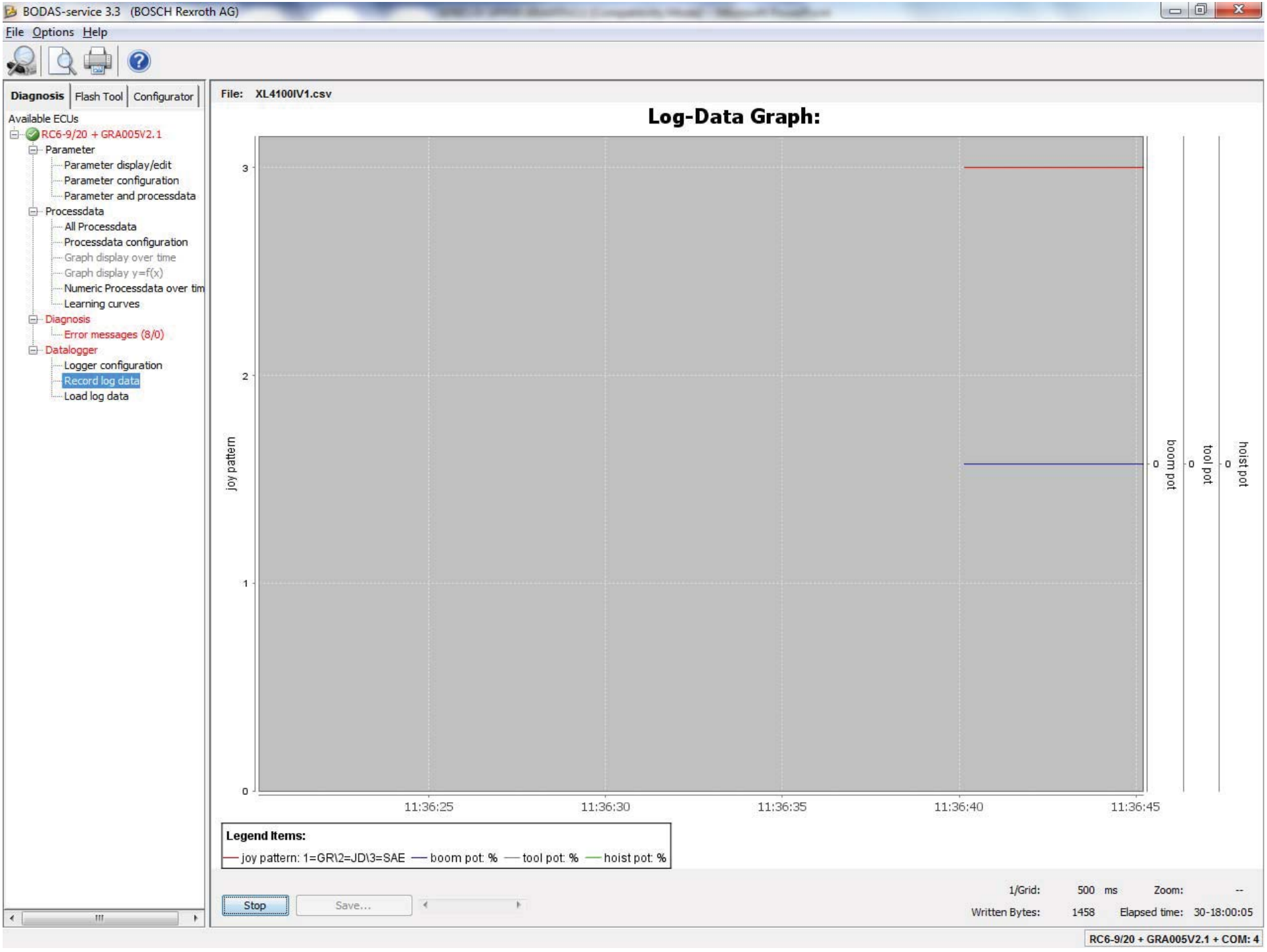

BODAS-service 3.3 (BOSCH Rexroth AG)
File Options Help
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Available ECUs
RC6-9/20 + GRA005V2.1
Parameter
Parameter display/edit
Parameter configuration
Parameter and processdata
Processdata
All Processdata
Processdata configuration
Graph display over time
Graph display y=f(x)
Numeric Processdata over tim
Learning curves
Diagnosis
Error messages (8/0)
Datalogger
Logger configuration
Record log data
Load log data
File:
Load log data
Look in:
Desktop
Recent Items
Desktop
My Documents
Computer
Network
Desktop
Hex Files SIII 12-1-2010
photos 2
PLUS+1
Shortcut to Excavator
Shortcut to Specials
Shortcut to VacAll
Sweeper Wiring Diagrams 9-13-10
Vacall Warranty Forms
File name:
XL4100IV 1
Open
Files of type:
CSV-files (.csv)
Cancel
Open log-file
1/Grid:
ms
Zoom:
Written Bytes:
Elapsed time:
RC6-9/20 + GRA005V2.1 + COM: 4

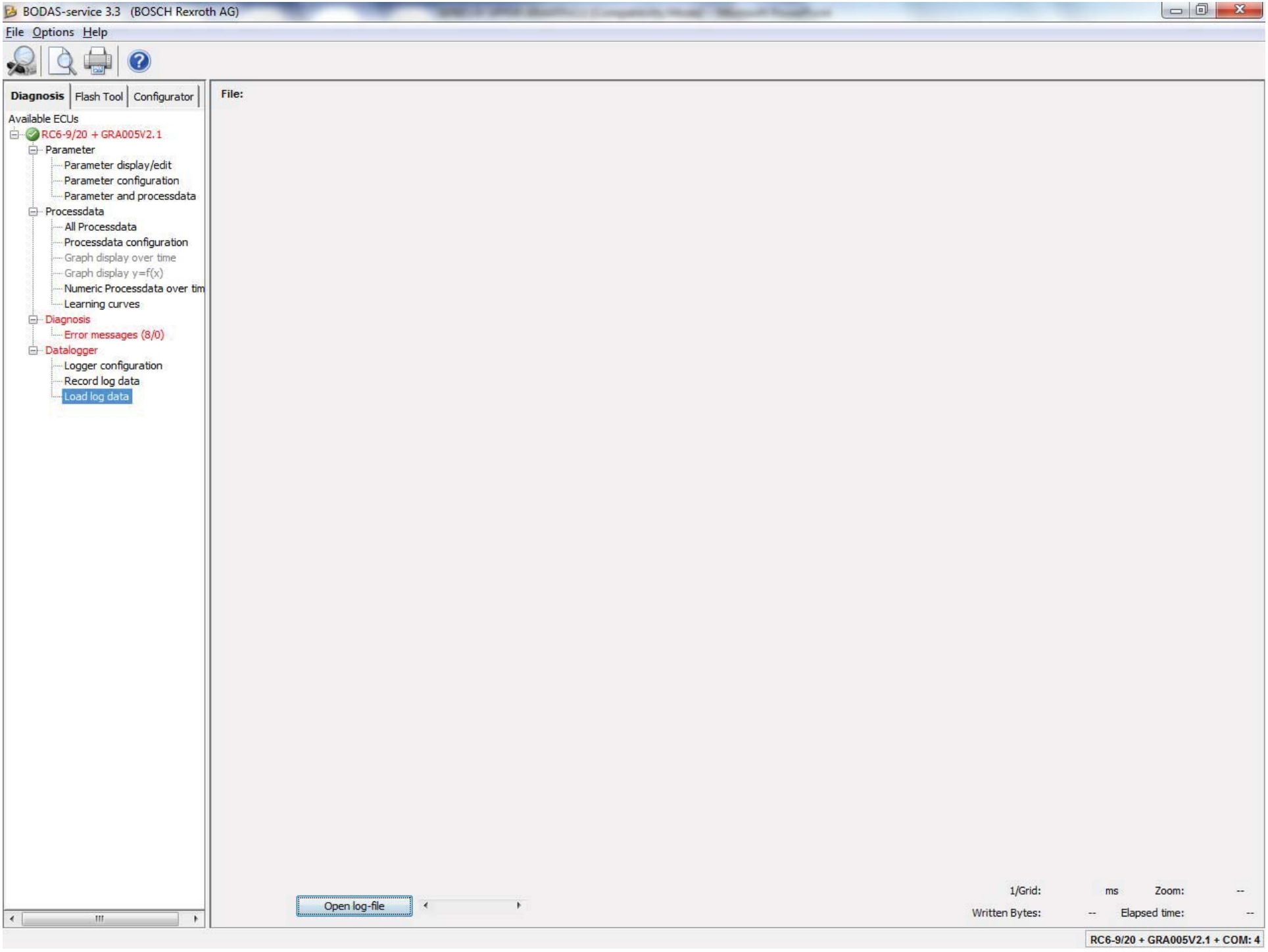

BODAS-service 3.3 (BOSCH Rexroth AG)
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Available ECUs
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Parameter
Parameter display/edit
Parameter configuration
Parameter and processdata
Processdata
All Processdata
Processdata configuration
Graph display over time
Graph display y=f(x)
Numeric Processdata over tim
Learning curves
Diagnosis
Error messages (8/0)
Datalogger
Logger configuration
Record log data
Load log data
Logger configuration
Select parameter and/or processdata and record learning curves.
Parameter:
Menus
Menu 1
Menu 2
Menu 3
Menu 4
Menu 5
Menu 6
Menu 7
Menu 8
Processdata:
Groups
Group 1
joy pattern
boom pot
tool pot
hoist pot
swing pot
eng spd pot
heater pot
travel pedal
Group 2
Group 3
Group 4
Group 5
Group 6
Group 7
Group 8
Selected:
Idx Name Auto Min Max Color
1.1 joy pattern 0 1
1.2 boom pot 0 1
1.3 tool pot 0 1
1.4 hoist pot 0 1
Deselect all
Get Processdata
Comment:
Stop logging after (sec): 0
1/Grid: 500
Sampletime: 0
RC6-9/20 + GRA005V2.1 + COM: 4

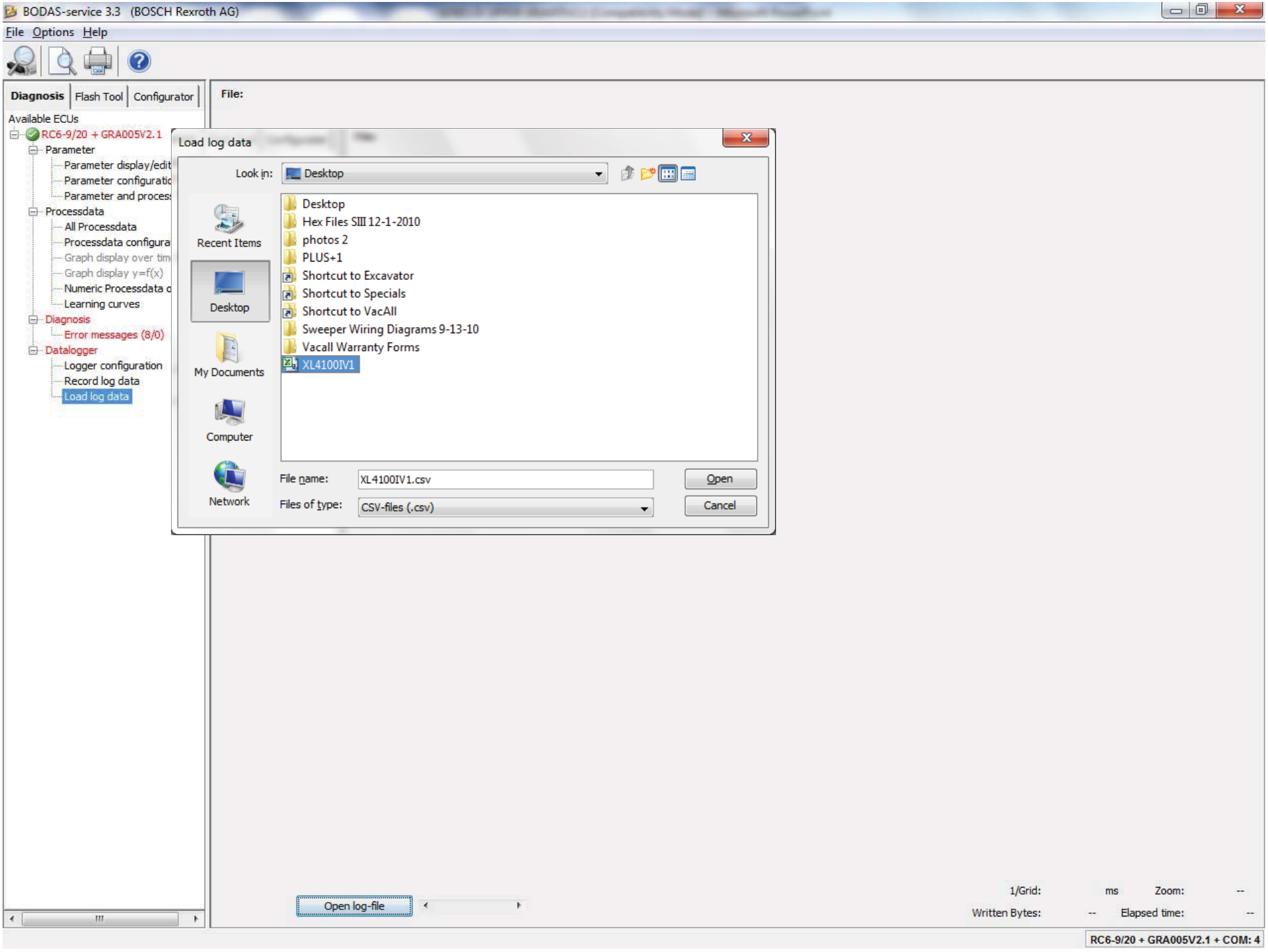

BODAS-service 3.3 (BOSCH Rexroth AG)
File Options Help
Diagnosis
Flash Tool
Configurator
Available ECUs
RC6-9/20 + GRA005V2.1
Parameter
Parameter display/edit
Parameter configuration
Parameter and processdata
Processdata
All Processdata
Processdata configuration
Graph display over time
Graph display y=f(x)
Numeric Processdata over tim
Learning curves
Diagnosis
Error messages (8/0)
Datalogger
Logger configuration
Record log data
Load log data
Logger configuration
Select parameter and/or processdata and record learning curves.
Parameter:
Menus
Menu 1
Menu 2
Menu 3
Menu 4
Menu 5
Menu 6
Menu 7
Menu 8
Processdata:
Groups
Group 1
joy pattern
boom pot
tool pot
hoist pot
swing pot
eng spd pot
heater pot
travel pedal
Group 2
Group 3
Group 4
Group 5
Group 6
Group 7
Group 8
Selected:
Idx
Name
Auto
Min
Max
Color
1.1 joy pattern 0 1
1.2 boom pot 0 1
1.3 tool pot 0 1
1.4 hoist pot 0 1
Deselect all
Get Processdata
Comment:
Stop logging after (sec): 10
1/Grid: 500
Sampletime: 0
RC6-9/20 + GRA005V2.1 + COM: 4


BODAS-service 3.3 (BOSCH Rexroth AG)
File Options Help
Diagnosis
Flash Tool
Configurator
Available ECUs
RC6-9/20 + GRA005V2.1
Parameter
Parameter display/edit
Parameter configuration
Parameter and processdata
Processdata
All Processdata
Processdata configuration
Graph display over time
Graph display y=f(x)
Numeric Processdata over tim
Learning curves
Diagnosis
Error messages (8/0)
Datalogger
Logger configuration
Record log data
Load log data
File:
Log-Data Graph:
joy pattern
boom pot
tool pot
hoist pot
1
0
18:59:40
18:59:45
18:59:50
18:59:55
19:00:00
Legend Items:
joy pattern: 1=GR\2=JD\3=SAE
boom pot: %
tool pot: %
hoist pot: %
Start
Save...
1/Grid:
500 ms
Zoom:
--
Written Bytes:
Elapsed time:
RC6-9/20 + GRA005V2.1 + COM: 4


BODAS-service 3.3 (BOSCH Rexroth AG)
File Options Help
Diagnosis
Flash Tool
Configurator
Available ECUs
RC6-9/20 + GRA005V2.1
Parameter
Parameter display/edit
Parameter configuration
Parameter and processd
Processdata
All Processdata
Processdata configuratio
Graph display over time
Graph display y=f(x)
Numeric Processdata ove
Learning curves
Diagnosis
Error messages (8/0)
Datalogger
Logger configuration
Record log data
Load log data
File:
Log-Data Graph:
Save logger data
Look in:
Desktop
Recent Items
Desktop
My Documents
Computer
Network
Desktop
Hex Files SIII 12-1-2010
photos 2
PLUS+1
Shortcut to Excavator
Shortcut to Specials
Shortcut to VacAll
Sweeper Wiring Diagrams 9-13-10
Vacall Warranty Forms
File name:
XL4100IV1
Files of type:
CSV-files (.csv)
Save
Cancel
boom pot
tool pot
hoist pot
18:59:40
18:59:45
18:59:50
18:59:55
19:00:00
Legend Items:
joy pattern: 1=GR\2=JD\3=SAE
boom pot: %
tool pot: %
hoist pot: %
Start
Save...
1/Grid:
500 ms
Zoom:
Written Bytes:
Elapsed time:
RC6-9/20 + GRA005V2.1 + COM: 4


BODAS-service 3.3 (BOSCH Rexroth AG)
File Options Help
Diagnosis
Flash Tool
Configurator
Available ECUs
RC6-9/20 + GRA005V2.1
Parameter
Parameter display/edit
Parameter configuration
Parameter and processdata
Processdata
All Processdata
Processdata configuration
Graph display over time
Graph display y=f(x)
Numeric Processdata over tim
Learning curves
Diagnosis
Error messages (8/0)
Datalogger
Logger configuration
Record log data
Load log data
File: XL4100IV1.csv
Log-Data Graph:
joy pattern
boom pot
tool pot
hoist pot
11:36:25
11:36:30
11:36:35
11:36:40
11:36:45
Legend Items:
joy pattern: 1=GR\2=JD\3=SAE
boom pot: %
tool pot: %
hoist pot: %
Stop
Save...
1/Grid: 500 ms
Zoom: --
Written Bytes: 1458
Elapsed time: 30-18:00:05
RC6-9/20 + GRA005V2.1 + COM: 4


BODAS-service 3.3 (BOSCH Rexroth AG)
File Options Help
Diagnosis
Flash Tool
Configurator
Available ECUs
RC6-9/20 + GRA005V2.1
Parameter
Parameter display/edit
Parameter configuration
Parameter and processdata
Processdata
All Processdata
Processdata configuration
Graph display over time
Graph display y=f(x)
Numeric Processdata over tim
Learning curves
Diagnosis
Error messages (8/0)
Datalogger
Logger configuration
Record log data
Load log data
File:
Open log-file
1/Grid:
ms
Zoom:
Written Bytes:
Elapsed time:
RC6-9/20 + GRA005V2.1 + COM: 4


BODAS-service 3.3 (BOSCH Rexroth AG)
File Options Help
Diagnosis
Flash Tool
Configurator
Available ECUs
RC6-9/20 + GRA005V2.1
Parameter
Parameter display/edit
Parameter configuratio
Parameter and proces
Processdata
All Processdata
Processdata configura
Graph display over tim
Graph display y=f(x)
Numeric Processdata c
Learning curves
Diagnosis
Error messages (8/0)
Datalogger
Logger configuration
Record log data
Load log data
File:
Load log data
Look in:
Desktop
Recent Items
Desktop
My Documents
Computer
Network
Desktop
Hex Files SIII 12-1-2010
photos 2
PLUS+1
Shortcut to Excavator
Shortcut to Specials
Shortcut to VacAll
Sweeper Wiring Diagrams 9-13-10
Vacall Warranty Forms
XL4100IV1
File name:
XL4100IV1.csv
Open
Files of type:
CSV-files (.csv)
Cancel
Open log-file
1/Grid:
ms
Zoom:
Written Bytes:
Elapsed time:
RC6-9/20 + GRA005V2.1 + COM: 4

DRAWING NUMBER 82109002 | REV. B

DRAWING NUMBER 82109002

LEFT SPARES

POD LAMP, INTERIOR 80363107

PILOT LEVER SWITCH, PROXIMITY 80363166

POTENTIOMETER ASSY, ROTARY 80765069 10KΩ

PARK BRAKE SWITCH, DPST, ON-OFF 80363111

BEACON SWITCH OPT.

RADIO, STEREO 80963314

RIGHT SPARES

POD LAMP, INTERIOR 80363107

WORK LIGHTS SWITCH, SPST, ON-OFF 91403304

BOOM LIGHTS SWITCH, SPST, ON-OFF 91403304

AUX SWITCH OPT.

OPT 1 SWITCH OPT.

OPT 2 SWITCH OPT.

SWITCH, WIPER INTERMITTENT 80435028

SWITCH, HVAC FAN 80964001

ASSEMBLY, EVAP/HEATER 82173006

TO UPPER CAB CONSOLE HARNESS SHEET 2

CAN TERM

SPEAKER RIGHT 80263029

SPEAKER LEFT 80263029

LAMP, INTERIOR DOME 80363107

OPTION LAMP, FLOOD LIGHT REAR

OPTION LAMP, FLOOD LIGHT FRONT

MOTOR, WIPER 80263081

OPT. BEACON PCB

JOYSTICK, LEFT 1600426

JOYSTICK, RIGHT 1600425

82173008 UPPER CAB HARNESS

REV	ZONE	DATE	BY	ER NO.	DESCRIPTION	CHK'D
B	ALL	9-20-16	AF	EC160071	CHANGED WIRING AT RIGHT JOYSTICK SWITCHES.	RDM

REVISIONS

SPECIFICATIONS

1) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2) ALL WELDING TO STRUCTURAL WELD CODE-STEEL ANSI/AWS D1.1
3) ALL DIMENSIONAL TOLERANCES ARE +-0.060
4) MACHINE TOLERANCE TO BE +-0.015
5) ALL ANGLES +-1 D.
6) MACH. SURF. 125 MAX

NEXT ASSY

DRAWN BY:	AF
DATE:	6-2-14
CHK'D BY:	RAB
DATE:	6-2-14
ER NO.:	ER150287
CAGE CODE:	
SIMILAR TO:	-

GRADALL

TITLE: ELECTRICAL SCHEMATIC D152/D154

MATL: N/A

SIZE - | DWG NO. 82109002 | REV B

SCALE: NTS | EST WT: N/A | SHEET: 1 OF 6

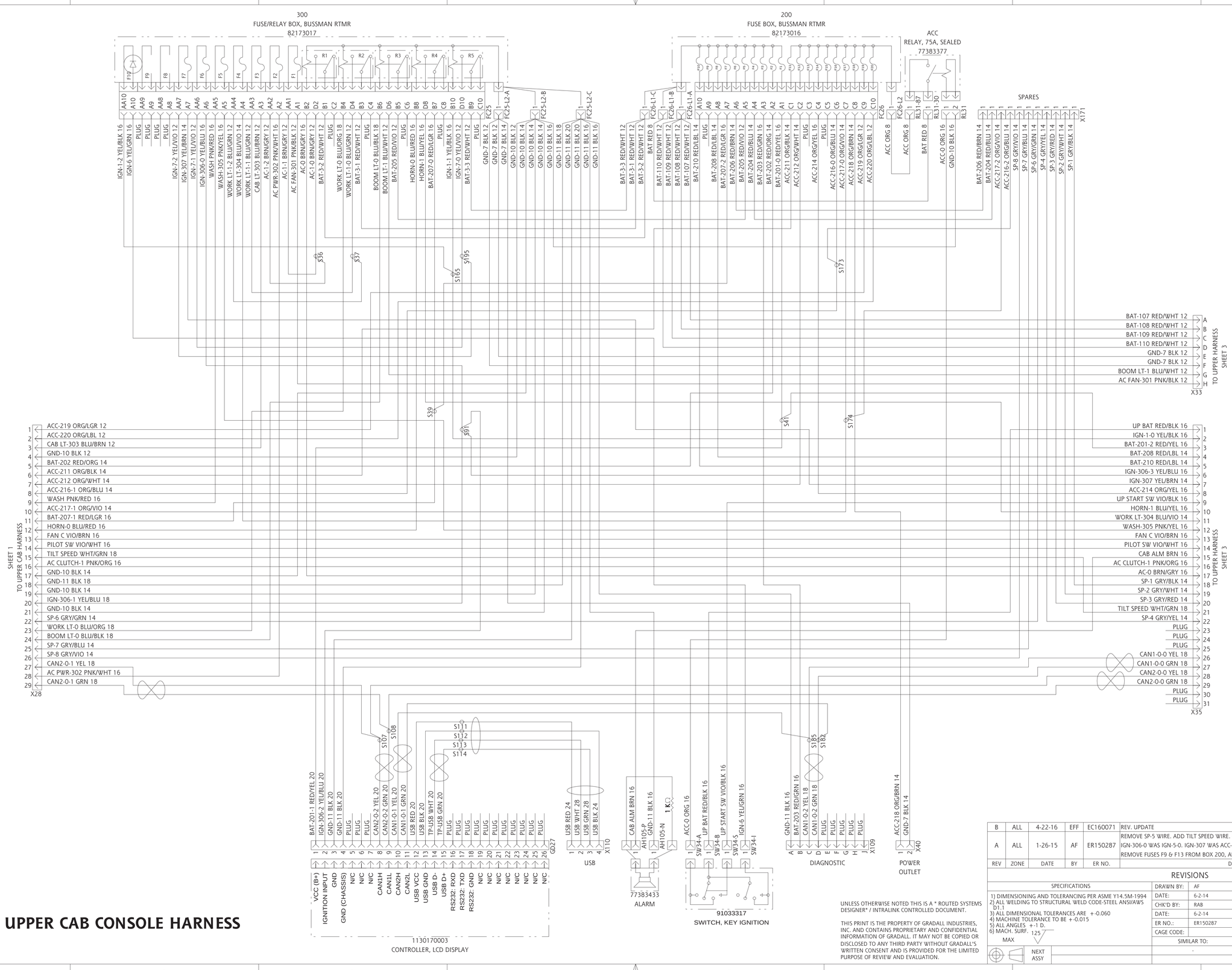
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DRAWING NUMBER 82109002 | REV. B

DRAWING NUMBER 82109002

82173012 UPPER CAB CONSOLE HARNESS



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REV	ZONE	DATE	BY	ER NO.	DESCRIPTION	CHK'D
B	ALL	4-22-16	EFF	EC160071	REV. UPDATE	AF
A	ALL	1-26-15	AF	ER150287	REMOVE SP-5 WIRE. ADD TILT SPEED WIRE. WASH-305 WAS WASH-310. ADD CAN1 TO G27. IGN-306-0 WAS IGN-5-0. IGN-307 WAS ACC-213. BAT-3-3 WAS BAT-209. ADD IGN-7. REMOVE FUSES F9 & F13 FROM BOX 200, ADD FUSES F6 & F7 TO BOX 300.	RAB

REVISIONS

SPECIFICATIONS

1) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2) ALL WELDING TO STRUCTURAL WELD CODE-STEEL ANSI/AWS D1.1
3) ALL DIMENSIONAL TOLERANCES ARE +-0.060
4) MACHINE TOLERANCE TO BE +-0.015
5) ALL ANGLES +-1 D.
6) MACH. SURF. 125 MAX

NEXT ASSY

DRAWN BY:	AF
DATE:	6-2-14
CHK'D BY:	RAB
DATE:	6-2-14
ER NO.:	ER150287
CAGE CODE:	
SIMILAR TO:	-

GRADALL

TITLE: ELECTRICAL SCHEMATIC D152/D154

MATL: N/A

SIZE: - | DWG NO.: 82109002 | REV: B

SCALE: NTS | EST WT: N/A | SHEET: 2 OF 6

DRAWING NUMBER
82109002

SHEET 2
TO UPPER CAB CONSOLE HARNESS
X35
1 UP BAT RED/BLK 16
2 IGN-1 YEL/BLK 16
3 BAT-201-0 RED/YEL 18 >> Sheet 4-[7,C]
4 BAT-208 RED/LBL 14 >> Sheet 4-[5,C]
5 BAT-210 RED/LBL 14 >> Sheet 4-[5,C]
6 IGN-306-0 YEL/BLU 18 >> Sheet 4-[7,C]
7 IGN-307-0 YEL/BRN 14 >> Sheet 4-[1,B]
8 ACC-214-0 ORG/YEL 16 >> Sheet 4-[1,B]
9 UP START SW VIO/BLK 18 >> Sheet 4-[3,C]
10 HORN-1-0 BLU/YEL 16
11 WORK LT-304-0 BLU/VIO 14
12 WASH-305 PNK/YEL 16
13 FAN C VIO/BRN 20 >> Sheet 4-[6,C]
14 PILOT SW VIO/WHT 20 >> Sheet 4-[6,C]
15 CAB ALM BRN 20 >> Sheet 4-[5,C]
16 AC CLUTCH-1 PNK/ORG 16
17 AC-0-2 BRN/GRY 18 >> Sheet 4-[7,C]
18 SP-1 GRY/BLK 14
19 SP-2 GRY/WHT 14
20 SP-3 GRY/RED 14
21 TILT SPEED WHT/GRN 20 >> Sheet 4-[7,C]
22 SP-4 GRY/YEL 14
23 PLUG
24 PLUG
25 PLUG
26 CAN1-0-4 YEL 18
27 CAN1-0-4 GRN 18
28 CAN2-0-1 YEL 18 >> Sheet 4-[8,C]
29 CAN2-0-1 GRN 18 >> Sheet 4-[8,C]
30 PLUG
31 PLUG

CAN1-0-1 YEL 18 >> Sheet 4-[8,B]
CAN1-0-1 GRN 18 >> Sheet 4-[8,B]
S30
S32

SHEET 2
TO UPPER CAB CONSOLE HARNESS
X33
A BAT-107 RED/WHT 12
B BAT-108 RED/WHT 12
C BAT-109 RED/WHT 12
D BAT-110 RED/WHT 12
E GND-7 BLK 12
F GND-7 BLK 12
G BOOM LT-1-0 BLU/WHT 12
H AC FAN-301 PNK/BLK 14

SHEET 5
CENTERPIN, HYDRAULIC SWIVEL
82133006
MS45-1
12 AWG A BAT-107 RED/WHT 12
12 AWG B BAT-108 RED/WHT 12
12 AWG C BAT-109 RED/WHT 12
12 AWG D BAT-110 RED/WHT 12
12 AWG E GND-1 BLK 12
12 AWG F GND-1 BLK 12
12 AWG G GND-1 BLK 12
12 AWG H GND-1 BLK 12

MS45-2
16 AWG 1 UP BAT RED/BLK 16
16 AWG 2 IGN-1 YEL/BLK 16
CAN L 3 CAN1-0-0 GRN 18
CAN H 4 CAN1-0-0 YEL 18
PLUG 5 PLUG
PLUG 6 PLUG

GND-1 BLK 12 X89-1
GND-1 BLK 12 X89-1
GND-1 BLK 12 X89-1
GND-7 BLK 12 X89-1
GND-7 BLK 12 X89-1
GND-1 BLK 12 X89-1
GND-7-2 BLK 12 X89-1
GND-7-3 BLK 20 Sheet 4-[1,B]
GND-7-3 BLK 20 Sheet 4-[1,B]
GND-7-3 BLK 16 Sheet 4-[2,D]
GND-7-3 BLK 16 Sheet 4-[2,D]
GND-7-3 BLK 16 Sheet 4-[2,D]
GND-7-3 BLK 10 Sheet 4-[5,C]
S156
GND-7-3 BLK 16 Sheet 4-[6,C]
GND-7-3 BLK 16 Sheet 4-[6,C]
GND-7-3 BLK 16 Sheet 4-[7,C]
GND-7-3 BLK 16 Sheet 4-[7,D]
GND-7-3 BLK 16 Sheet 4-[6,B]
GND-8 BLK 18 X89-4
GND-8 BLK 14 X89-4
GND-8 BLK 14 X89-4
GND-8 BLK 16 X89-4
GND-8 BLK 16 X89-4
GND-9 BLK 14 X89-4
GND-9 BLK 16 X89-4
GND-9 BLK 14 X89-4
GND-9 BLK 14 X89-4
GND-9 BLK 16 X89-4
Sheet 4-[6,B]
Sheet 4-[7,B]

GROUND BOLT

WORK LT-304-2 BLU/VIO 14 1 GND-9 BLK 14 2 LB137
LAMP, FLOOD LIGHT OPTION VALVE
WORK LT-304-1 BLU/VIO 14 S157 1 GND-9 BLK 14 2 LB80
LAMP, FLOOD LIGHT OPTION VALVE
BOOM LT-1-1 BLU/WHT 14 S106 1 GND-9 BLK 14 2 LB81
LAMP, FLOOD LIGHT OPTION BOOM
BOOM LT-1-2 BLU/WHT 14 1 GND-9 BLK 14 2 LB82
LAMP, FLOOD LIGHT OPTION BOOM

WASH-305 PNK/YEL 16 1 GND-9 BLK 16 2 WH67
WASH-305 PNK/YEL 16 WH67 K GND-9 BLK 16 A MS87
BOTTLE, WASHER FLUID 83683085

AC CLUTCH-2 PNK/GRN 16 K GND-9 BLK 16 A MS86
AC CLUTCH-2 PNK/GRN 16 1 WH86-C 2 AC FAN-301 PNK/BLK 14 GND-8 BLK 14 WH86-FAN
AC CLUTCH-1 PNK/ORG 16 1 AC CLUTCH-2 PNK/GRN 16 2 WH86-SW
82173005
ASSEMBLY, CONDENSER

S103
HORN-1-2 BLU/YEL 16 K GND-8 BLK 16 A MS78 HORN-1-2 BLU/YEL 16 1 AH78
91143357 HORN REAR
HORN-1-1 BLU/YEL 16 K GND-8 BLK 16 A MS77 HORN-1-1 BLU/YEL 16 1 AH77
91143357 HORN FRONT

GND-8 BLK 14 1 GND-8 BLK 14 1 GND-8 BLK 14 1 SP-4 GRY/YEL 14 1 SP-3 GRY/RED 14 1 SP-2 GRY/WHT 14 1 SP-1 GRY/BLK 14 1 X172
SPARES

82173009 UPPER HARNESS

REV	ZONE	DATE	BY	ER NO.	DESCRIPTION	CHK'D
B	ALL	4-22-16	EFF	EC160071	REV. UPDATE	AF
A	ALL	1-26-15	AF	ER150287	ADDED TILT SPEED WHT/GRN WIRE FROM X35p22 TO CO75-2p31	RAB

REVISIONS

SPECIFICATIONS
1) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2) ALL WELDING TO STRUCTURAL WELD CODE-STEEL ANSI/AWS D1.1
3) ALL DIMENSIONAL TOLERANCES ARE +-0.060
4) MACHINE TOLERANCE TO BE +-0.015
5) ALL ANGLES +-1 D.
6) MACH. SURF. 125 MAX

NEXT ASSY

DRAWN BY:	AF
DATE:	6-2-14
CHK'D BY:	RAB
DATE:	6-2-14
ER NO.:	ER150287
CAGE CODE:	
SIMILAR TO:	-

GRADALL

TITLE: ELECTRICAL SCHEMATIC D152/D154

MATL: N/A

SIZE - | DWG NO. 82109002 | REV B

SCALE: NTS | EST WT: N/A | SHEET: 3 OF 6

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DRAWING NUMBER 82109002

DRAWING NUMBER 82109002 | REV. B

CONTROLLER, RC12-10/30
82173002

| | | |

DRAWING NUMBER 82109002 | REV. B

DRAWING NUMBER 82109002

82173052 CHASSIS HARNESS

CONTROLLER, EXPANSION MODULE, RC4-5/30
82173001

DIAG. CAN TERMINATOR
120

OPTION STROBE
X146
LB149

100
FUSE BLOCK, BUSSMANN RTMR
VA2298-0008

FAN 1 RELAY, PRM
VA2764-0035

FAN 2 RELAY, PRM
VA2764-0035

GROUND TERMINAL, BUS 5/16
1130200008

S102 S101 S133 S93 S74 S144 S152 S208 S147 S73 S72

SHEET 6 TO CHASSIS CAB HARNESS
X49

ALLISON TCM
EC141

FREIGHTLINER CHASSIS MODULE C5 CONNECTOR
EC148

TO BOOM REST HARNESS SHEET 6
X205

MS45-1
MS45-2

82133006 CENTERPIN, HYDRAULIC SWIVEL SHEET 3

91403420 ALARM, BACKUP TRAVEL ALARM

2110390002 AIR VALVE, DOUBLE TRAVEL/REMOTE

2110390001 AIR VALVE, SINGLE BRAKE

82173015 BRAKE

82173015 LOW AIR

80383228 VALVE, AXLE LOCK

82133009 VALVE, REMOTE STEERING

82173029 CIRCUIT BREAKER, MRCB, 100A

BATTERY

REV	ZONE	DATE	BY	ER NO.	DESCRIPTION	CHK'D
B	ALL	9-20-16	EFF	EC160071	82173052 WAS 82173010.	RDM
A	ALL	12-3-14	AF	ER150287	CHANGED MS60 & MS63 CONNECTORS. CHANGED WIRING & COLORS AT SN51 AND SN127. CHANGED CAN WIRING IN CO90. ADDED X146. CHAGED WIRING IN FC48	RAB

REVISIONS

SPECIFICATIONS
1) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2) ALL WELDING TO STRUCTURAL WELD CODE-STEEL ANSI/AWS D1.1
3) ALL DIMENSIONAL TOLERANCES ARE +-0.060
4) MACHINE TOLERANCE TO BE +-0.015
5) ALL ANGLES +-1 D.
6) MACH. SURF. 125 MAX

NEXT ASSY

DRAWN BY: AF
DATE: 6-2-14
CHK'D BY: RAB
DATE: 6-2-14
ER NO.: ER150287
CAGE CODE:
SIMILAR TO: -

GRADALL

TITLE: ELECTRICAL SCHEMATIC D152/D154

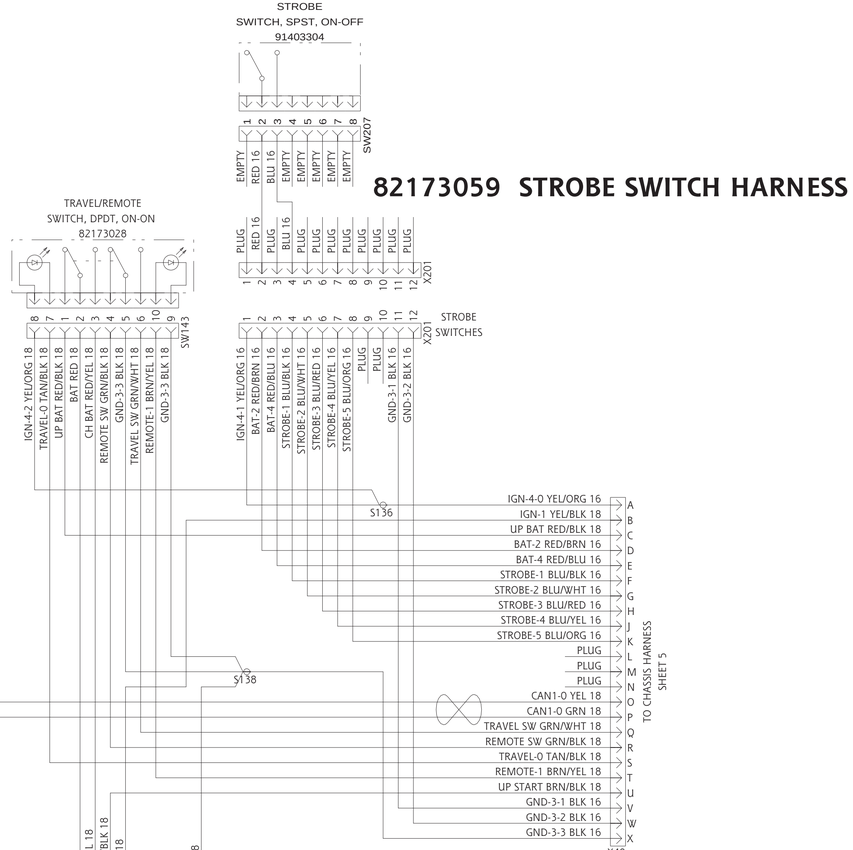
MATL: N/A
SIZE - | DWG NO. 82109002 | REV B
SCALE: NTS | EST WT: N/A | SHEET: 5 OF 6

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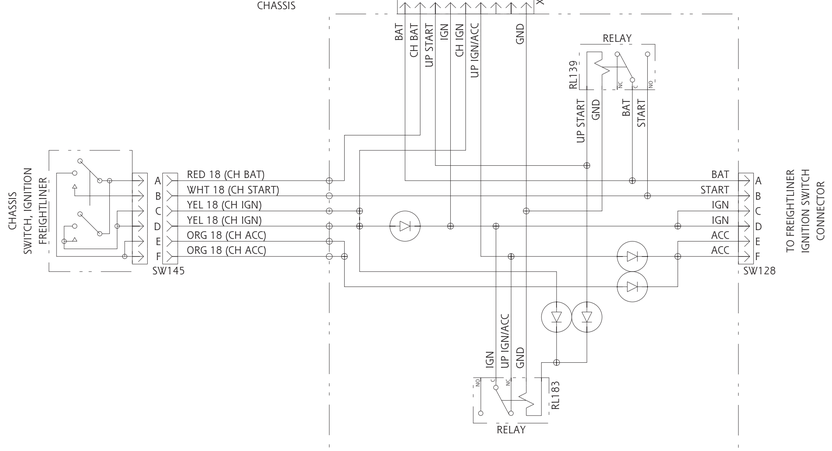
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DRAWING NUMBER
82109002

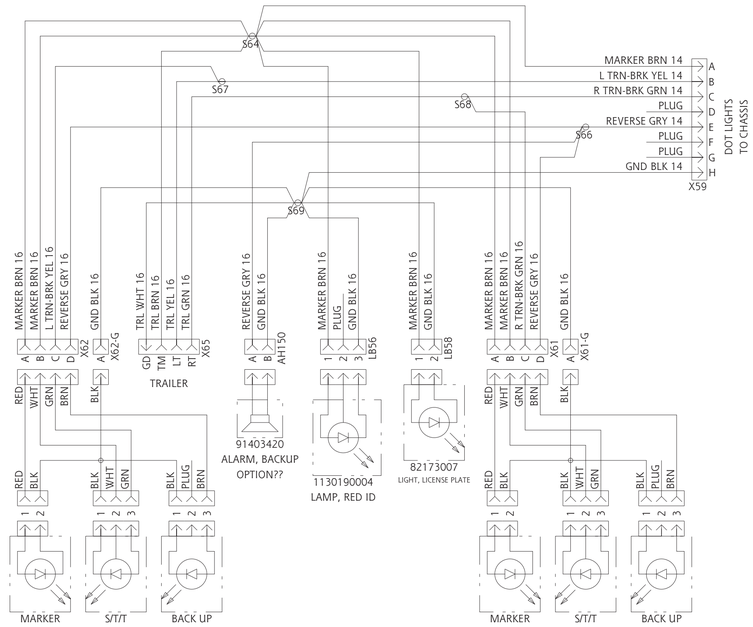
82173059 STROBE SWITCH HARNESS



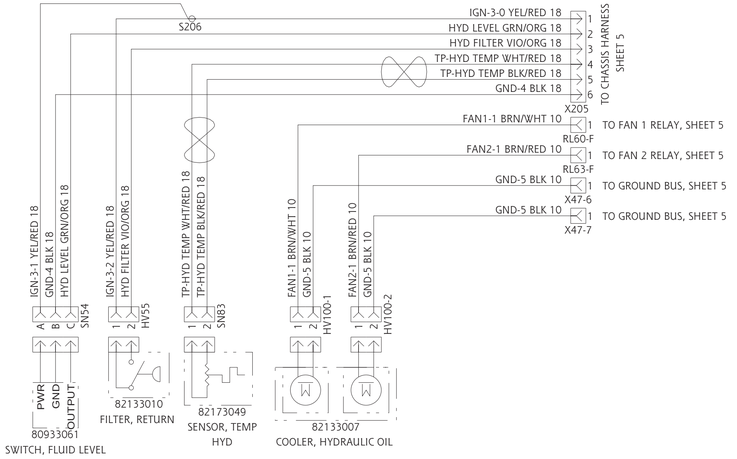
82173013 CHASSIS CAB HARNESS



82173019 IGNITION SWITCH PCB, FREIGHTLINER



82173014 CHASSIS TAIL LIGHTS HARNESS



82173058 BOOM REST HARNESS

REV	ZONE	DATE	BY	ER NO.	DESCRIPTION	CHK'D
B	ALL	9-20-16	EFF	EC160071	ADDED EC130 TO 82173013, ADDED 82173058 BOOM REST HARNESS. ADDED 82173059 STROBE SWITCH HARNESS.	AF
A	ALL	1-26-15	A	ER150287	CHANGED WIRING IN SW143.	RAB

REVISIONS

SPECIFICATIONS

1) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2) ALL WELDING TO STRUCTURAL WELD CODE-STEEL ANSI/AWS D1.1
3) ALL DIMENSIONAL TOLERANCES ARE +-0.060
4) MACHINE TOLERANCE TO BE +-0.015
5) ALL ANGLES +-1 D.
6) MACH. SURF. 125 MAX

NEXT ASSY

DRAWN BY:	AF
DATE:	6-2-14
CHK'D BY:	RAB
DATE:	6-2-14
ER NO.:	ER150287
CAGE CODE:	
SIMILAR TO:	.

GRADALL

TITLE: ELECTRICAL SCHEMATIC D152/D154

MATL: N/A

SIZE: - | DWG NO.: 82109002 | REV: B

SCALE: NTS | EST WT: N/A | SHEET: 6 OF 6

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DRAWING NUMBER 82173009

TERMINAL TABLE

REF	TERMINAL INDEX #	QTY	VENDOR	TERMINAL GRADALL PART NUMBER (REF)	TERMINAL VENDOR PART NUMBER	SEAL GRADALL PART NUMBER (REF)	SEAL VENDOR PART NUMBER	DESCRIPTION
	AT002	2	AMP	-	63097-1	-	-	TERMINAL, POSI LOK MARK II, RECPT .250 x .032, TIN, 14-18 AWG
	AT010	2	AMP	-	42100-2	-	-	TERMINAL, FASTIN-FASTON, RECPT .250 x .032, TIN, 14-18 AWG
A	DT008	65	DEUTSCH	77363229	0462-201-16141	-	-	TERMINAL, SOLID, SOCKET 16, NICKEL, 16-20 AWG
B	DT009	18	DEUTSCH	80463058	0462-209-16141	-	-	TERMINAL, SOLID, SOCKET 16, NICKEL, 14 AWG
	DT010	16	DEUTSCH	77363347	0462-203-12141	-	-	TERMINAL, SOLID, SOCKET 12, NICKEL, 12-14 AWG
	DT017	4	DEUTSCH	77373060	0462-201-2031	-	-	TERMINAL, SOLID, SOCKET 20, GOLD, 20 AWG
	DT018	6	DEUTSCH	88991141	0462-201-16311	-	-	TERMINAL, SOLID, SOCKET 16, GOLD, 16-20 AWG
A	DT051	10	DEUTSCH	77363230	114017	-	-	TERMINAL, PLUG 12-16
	PT009	3	PACKARD	-	12089188	91143187	12089444	TERMINAL, WEATHER-PACK, SLEEVE, TIN, 18-20 AWG, TAN SEAL
	PT010	4	PACKARD	-	12089188	-	12041352	TERMINAL, WEATHER-PACK, SLEEVE, TIN, 18-20 AWG, PURPLE SEAL
	PT046	2	PACKARD	-	12103360	-	-	TERMINAL, METRI-PACK 280 P2S, FEMALE, TIN, 20-22 AWG
A	XT005	44	BOSCH	-	1 928 498 135	-	-	TERMINAL, MATRIX 1.2, FEMALE, SILVER, 18-20 AWG
	XT006	5	BOSCH	-	1 928 498 136	-	-	TERMINAL, MATRIX 1.2, FEMALE, SILVER, 16 AWG
	XT007	6	BOSCH	-	1 928 498 057	-	1 928 300 600	TERMINAL, BDK 2.8, FEMALE, TIN, 14-16 AWG, WHITE SEAL

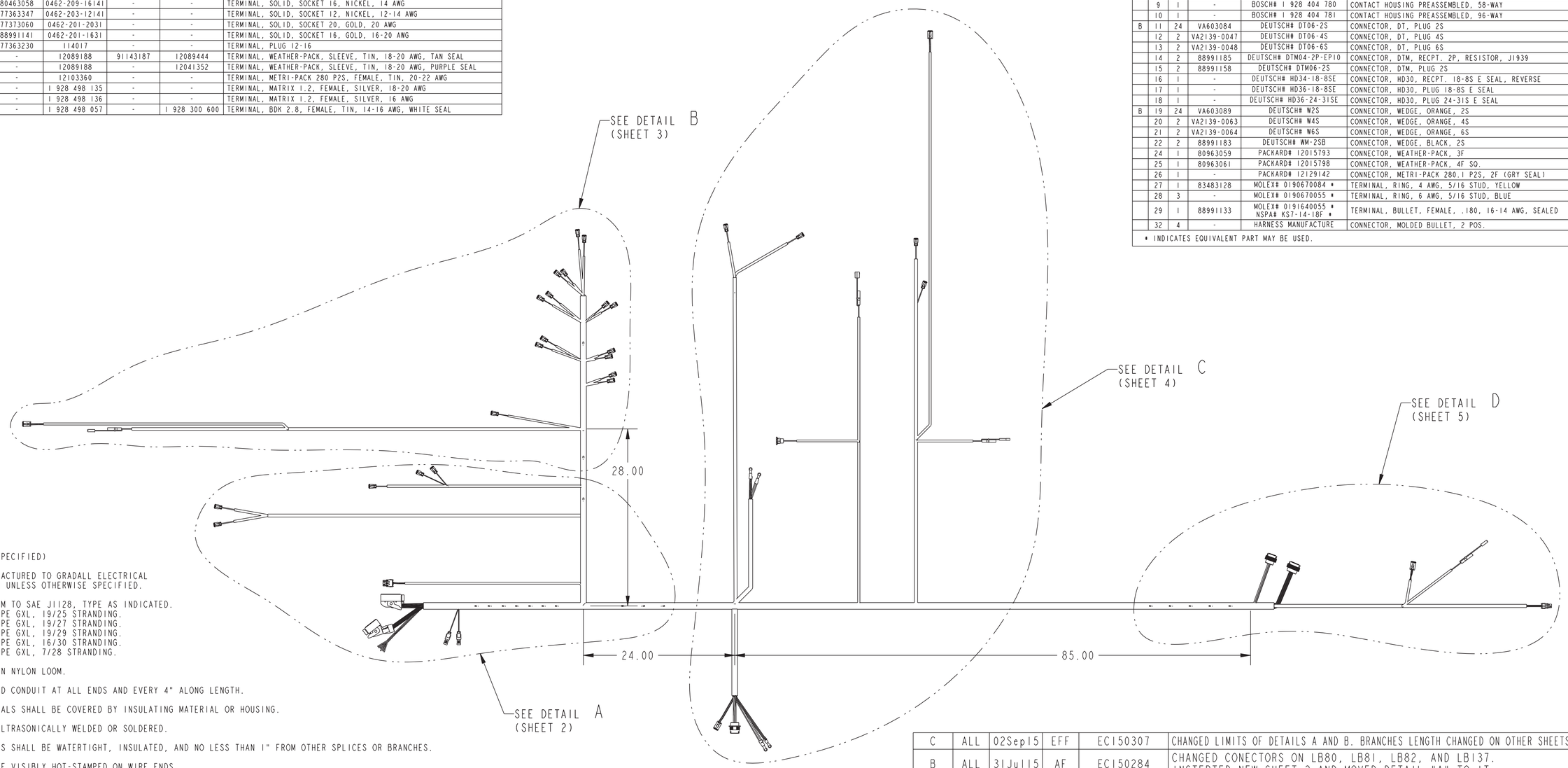
TWISTED WIRES:
ALL WIRES WITH DESIGNATIONS BEGINNING WITH CAN, TP, OR TT ARE TWISTED WIRES.
ALL TWISTED WIRES SHALL HAVE A MINIMUM TWIST OF 1.5 TWISTS PER INCH.

CAN: SHALL BE A YELLOW AND GREEN TWISTED PAIR.
TP: SHALL BE A TWISTED PAIR, WIRE COLOR AS INDICATED.
TT: SHALL BE TWISTED TRIAD, WIRE COLOR AS INDICATED.
USB CABLE: SHALL BE CABLE SUPPLIED WITH USB CONNECTOR/CABLE ASSEMBLY.

CONNECTOR PARTS LIST

REV	ITEM	QTY	GRADALL PART NUMBER (REF)	VENDOR	DESCRIPTION
	1	4	91363021	JULIAN# 08HA0004 *	DIODE, MOLDED
	2	2	-	AMP# 172076-1	CONNECTOR, MARK II 0.250, 1F POSI-LOCK HOUSING
	3	1	-	AMP# 180907-0	CONNECTOR, FASTIN-FASTON 0.250, 2F HOUSING (TEE)
	4	1	-	BOSCH# 1 928 404 760	SECONDARY LOCKING, 58-WAY
	5	1	-	BOSCH# 1 928 404 761	SECONDARY LOCKING, 58-WAY
	6	1	-	BOSCH# 1 928 404 762	SECONDARY LOCKING, 96-WAY
	7	1	-	BOSCH# 1 928 404 773	COVER PREASSEMBLED, 96-WAY
	8	1	-	BOSCH# 1 928 404 774	COVER PREASSEMBLED, 58-WAY
	9	1	-	BOSCH# 1 928 404 780	CONTACT HOUSING PREASSEMBLED, 58-WAY
	10	1	-	BOSCH# 1 928 404 781	CONTACT HOUSING PREASSEMBLED, 96-WAY
B	11	24	VA603084	DEUTSCH# DT06-2S	CONNECTOR, DT, PLUG 2S
	12	2	VA2139-0047	DEUTSCH# DT06-4S	CONNECTOR, DT, PLUG 4S
	13	2	VA2139-0048	DEUTSCH# DT06-6S	CONNECTOR, DT, PLUG 6S
	14	2	88991185	DEUTSCH# DTM04-2P-EP10	CONNECTOR, DTM, RECPT. 2P, RESISTOR, J1939
	15	2	88991158	DEUTSCH# DTM06-2S	CONNECTOR, DTM, PLUG 2S
	16	1	-	DEUTSCH# HD34-18-8SE	CONNECTOR, HD30, RECPT. 18-8S E SEAL, REVERSE
	17	1	-	DEUTSCH# HD36-18-8SE	CONNECTOR, HD30, PLUG 18-8S E SEAL
	18	1	-	DEUTSCH# HD36-24-31SE	CONNECTOR, HD30, PLUG 24-31S E SEAL
B	19	24	VA603089	DEUTSCH# W2S	CONNECTOR, WEDGE, ORANGE, 2S
	20	2	VA2139-0063	DEUTSCH# W4S	CONNECTOR, WEDGE, ORANGE, 4S
	21	2	VA2139-0064	DEUTSCH# W6S	CONNECTOR, WEDGE, ORANGE, 6S
	22	2	88991183	DEUTSCH# WM-2SB	CONNECTOR, WEDGE, BLACK, 2S
	24	1	80963059	PACKARD# 12015793	CONNECTOR, WEATHER-PACK, 3F
	25	1	80963061	PACKARD# 12015798	CONNECTOR, WEATHER-PACK, 4F SQ.
	26	1	-	PACKARD# 12129142	CONNECTOR, METRI-PACK 280.1 P2S, 2F (GRY SEAL)
	27	1	83483128	MOLEX# 0190670084 *	TERMINAL, RING, 4 AWG, 5/16 STUD, YELLOW
	28	3	-	MOLEX# 0190670055 *	TERMINAL, RING, 6 AWG, 5/16 STUD, BLUE
	29	1	88991133	MOLEX# 0191640055 * NSPA# KS7-14-18F *	TERMINAL, BULLET, FEMALE, .180, 16-14 AWG, SEALED
	32	4	-	HARNESS MANUFACTURE	CONNECTOR, MOLDED BULLET, 2 POS.

* INDICATES EQUIVALENT PART MAY BE USED.



NOTES: (UNLESS OTHERWISE SPECIFIED)

1. HARNESS SHALL BE MANUFACTURED TO GRADALL ELECTRICAL SPECIFICATION 77319050 UNLESS OTHERWISE SPECIFIED.
2. ALL WIRES SHALL CONFORM TO SAE J1128, TYPE AS INDICATED.
   12 GAUGE WIRE TO BE TYPE GXL, 19/25 STRANDING.
   14 GAUGE WIRE TO BE TYPE GXL, 19/27 STRANDING.
   16 GAUGE WIRE TO BE TYPE GXL, 19/29 STRANDING.
   18 GAUGE WIRE TO BE TYPE GXL, 16/30 STRANDING.
   20 GAUGE WIRE TO BE TYPE GXL, 7/28 STRANDING.
3. WRAP HARNESS WITH WOVEN NYLON LOOM.
4. TAPE SLITTED CORRUGATED CONDUIT AT ALL ENDS AND EVERY 4" ALONG LENGTH.
5. ALL UNINSULATED TERMINALS SHALL BE COVERED BY INSULATING MATERIAL OR HOUSING.
6. ALL SPLICES SHALL BE ULTRASONICALLY WELDED OR SOLDERED.
7. ALL SPLICED CONNECTIONS SHALL BE WATERTIGHT, INSULATED, AND NO LESS THAN 1" FROM OTHER SPLICES OR BRANCHES.
8. WIRE DESIGNATIONS TO BE VISIBLY HOT-STAMPED ON WIRE ENDS.
9. DESIGNATION LABELS ARE SHOWN IN BOXED NOTES (ARROW SHOWING PLACEMENT OF LABEL).
   THEY SHOULD BE THE WRAP-AROUND KIND (NOT FLAG STYLE), WITH A PERMANENT WEATHER AND OIL RESISTANT MATERIAL.
   THIS IS FOR ASSEMBLY AND TROUBLESHOOTING PURPOSES.
10. TERMINAL PART NUMBERS FOR REFERENCE. ALTERNATE PART NUMBERS MAY BE USED BASED ON HARNESS MANUFACTURING PROCESSES.
11. LENGTH TOLERANCES FOR TOTAL BRANCH RUNS:
    UP TO 6.00 _ _ _ _ _ ±0.50
    6.00 TO 36.00 _ _ _ _ +1.00/-0.50
    36.00 AND UP _ _ _ _ +2.00/-0.50
12. WIRES NOT IN LOOM SHALL BE ZIP TIED TOGETHER INTO BUNDLES AS SHOWN AND WITH FOLLOWING INSTRUCTIONS:
    -ALL BRANCHES SHALL HAVE A ZIP TIE AT BASE OF BRANCH.
    -NO ZIP TIES WITHIN 3" TO 4" OF A CONNECTOR (UNLESS OTHERWISE SPECIFIED).
    -ZIP TIES SHALL BE PLACED AT A MAXIMUM OF EVER 3" ALONG THEIR LENGTHS.
    -THERE SHALL BE NO BUNDLE OF WIRES LONGER THAT 3" (UNLESS UNDER LOOM OR A SINGLE WIRE) WITHOUT ZIP TIES.
13. HARNESS SHALL BE IDENTIFIED WITH GRADALL PART NUMBER, REVISION, VENDOR PART NUMBER, AND BUILD CODE.
14. ALL CIRCUITS MUST BE ELECTRICALLY TESTED FOR CONTINUITY AND CORRECT POSITION. ALL DIODES TO BE TESTED FOR CORRECT BIASING.

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2) ALL DIMENSIONS ARE IN INCHES.

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REV	ZONE	DATE	BY	ER NO.	DESCRIPTION	CHKD
C	ALL	02Sep15	EFF	EC150307	CHANGED LIMITS OF DETAILS A AND B. BRANCHES LENGTH CHANGED ON OTHER SHEETS	RAB
B	ALL	31Jul15	AF	EC150284	CHANGED CONECTORS ON LB80, LB81, LB82, AND LB137. INSTERTED NEW SHEET 2 AND MOVED DETAIL "A" TO IT.	RAB
A	ALL	15Apr15	EFF	EC150122	CHANGED DIMENTION REFERENCE (24.00). CHANGED NOTE 9. UPDATED TABLES.	AF

REVISIONS

SPECIFICATIONS
1) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2) ALL WELDING TO STRUCTURAL WELD CODE-STEEL ANSI/AWS D1.1
3) ALL DIMENSIONAL TOLERANCES ARE ± .060
4) MACHINE TOLERANCE TO BE ± .015
5) ALL ANGLES ± 1°
6) MACH. SURF. 125 MAX

NEXT ASSY 82179001

DRAWN BY:	EFF
DATE:	12-Sep-14
CHK'D BY:	AF
DATE:	12-Sep-14
ER NO.:	SO3259735-57
CAGE CODE:	
SIMILAR TO:	
FINISH COAT REQ:	N

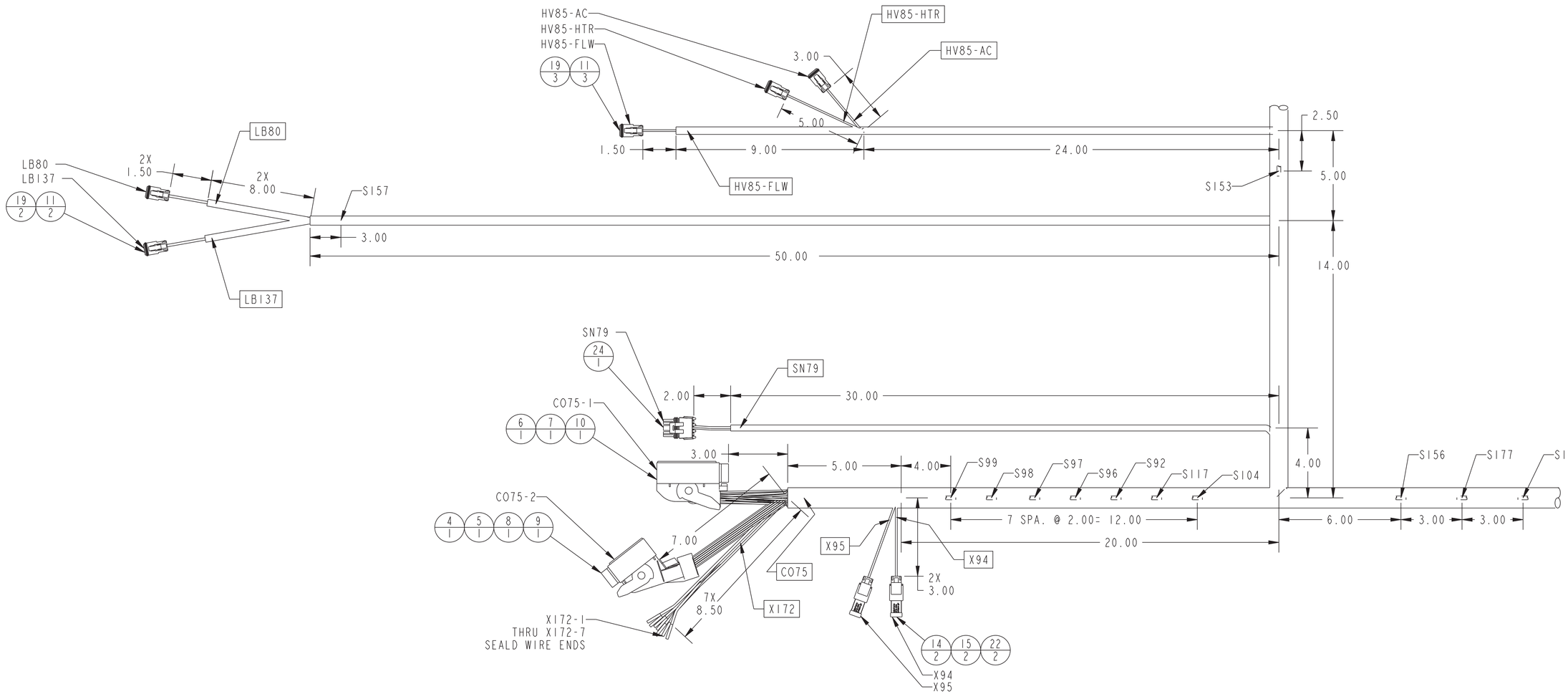
GRADALL

TITLE: HARNESS, UPPER

MATL: SEE PARTS LIST

SIZE D | DWG NO. 82173009 | REV C

SCALE: 1/32 | EST WT: 18.4# | SHEET: 1 OF 8



DETAIL A
SCALE 3/8

REV	ZONE	DATE	BY	ER NO.	DESCRIPTION	CHKD
C	ALL	02Sep15	EFF	EC150307	CHNAGED BRNACHES & LENGTHS AT SN79, LB80, & HV85	RAB
B	ALL D7 B5	31Jul15	AF	EC150284	INSERTED NEW SHEET 2. MOVED DETAIL "A" TO NEW SHEET 2. CHANGED CONECTORS AND LEAD LENGTH AT LB80 AND LB137. ADDED LABEL X172.	RAB

REVISIONS

SPECIFICATIONS

1) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2) ALL WELDING TO STRUCTURAL WELD CODE-STEEL ANSI/AWS D1.1
3) ALL DIMENSIONAL TOLERANCES ARE ± .060
4) MACHINE TOLERANCE TO BE ± .015
5) ALL ANGLES ± 1°
6) MACH. SURF. 125 MAX

NEXT ASSY 82179001

DRAWN BY:	EFF
DATE:	31-Jul-15
CHK'D BY:	AF
DATE:	31-Jul-15
ER NO.:	SO3259735-57
CAGE CODE:	
SIMILAR TO:	
FINISH COAT REQ:	N

GRADALL

TITLE: HARNESS, UPPER

MATL: SEE PARTS LIST

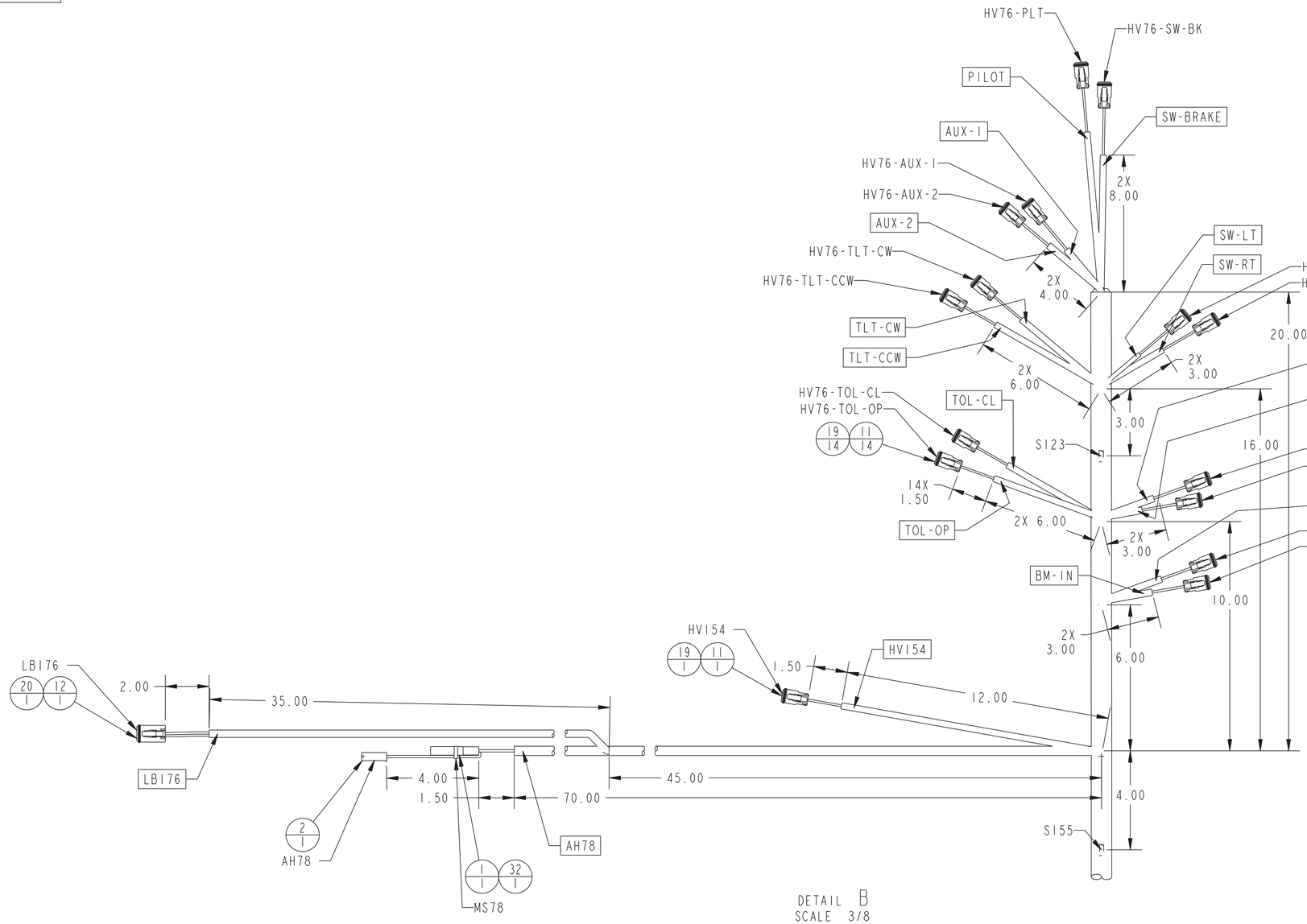
SIZE D | DWG NO. 82173009 | REV C

SCALE: 1/32 | EST WT: 18.4# | SHEET: 2 OF 8

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DRAWING NUMBER 82173009



DETAIL B
SCALE 3/8

REV	ZONE	DATE	BY	ER NO.	DESCRIPTION	CHKD
C	ALL	02Sep15	EFF	EC150307	UPDATED ALL DIMENSIONS	RAB
B	ALL D4	31Jul15	AF	EC150284	MOVED VIEW "A" TO SHEET 2. CORECTED LABELS AT HV76-PLT AND HV76-SW-BK.	RAB
A	ALL	15Apr15	EFF	EC150122	(DETAIL A) MOVED C075-2, X94, X95, S98, & S99. (DETAIL B) ADDED BRAID SECTIONS TO HV76-AUX-1 & AUX-2. HV76-TOL-OP WAS HV76-TL-OP, HV76-TOL-CL WAS HV76-TL-CL, HV76-TLT-CW WAS HV76-TL-CW, HV76-TLT-CCW WAS HV76-TTL-CCW	AF

REVISIONS

SPECIFICATIONS

1) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2) ALL WELDING TO STRUCTURAL WELD CODE-STEEL ANSI/AWS D1.1
3) ALL DIMENSIONAL TOLERANCES ARE ± .060
4) MACHINE TOLERANCE TO BE ± .015
5) ALL ANGLES ± 1°
6) MACH. SURF. 125 MAX

NEXT ASSY 82179001

DRAWN BY:	EFF
DATE:	12-Sep-14
CHK'D BY:	AF
DATE:	12-Sep-14
ER NO.:	S03259735-57
CAGE CODE:	
SIMILAR TO:	
FINISH COAT REQ:	N

GRADALL

TITLE: HARNESS, UPPER

MATL: SEE PARTS LIST

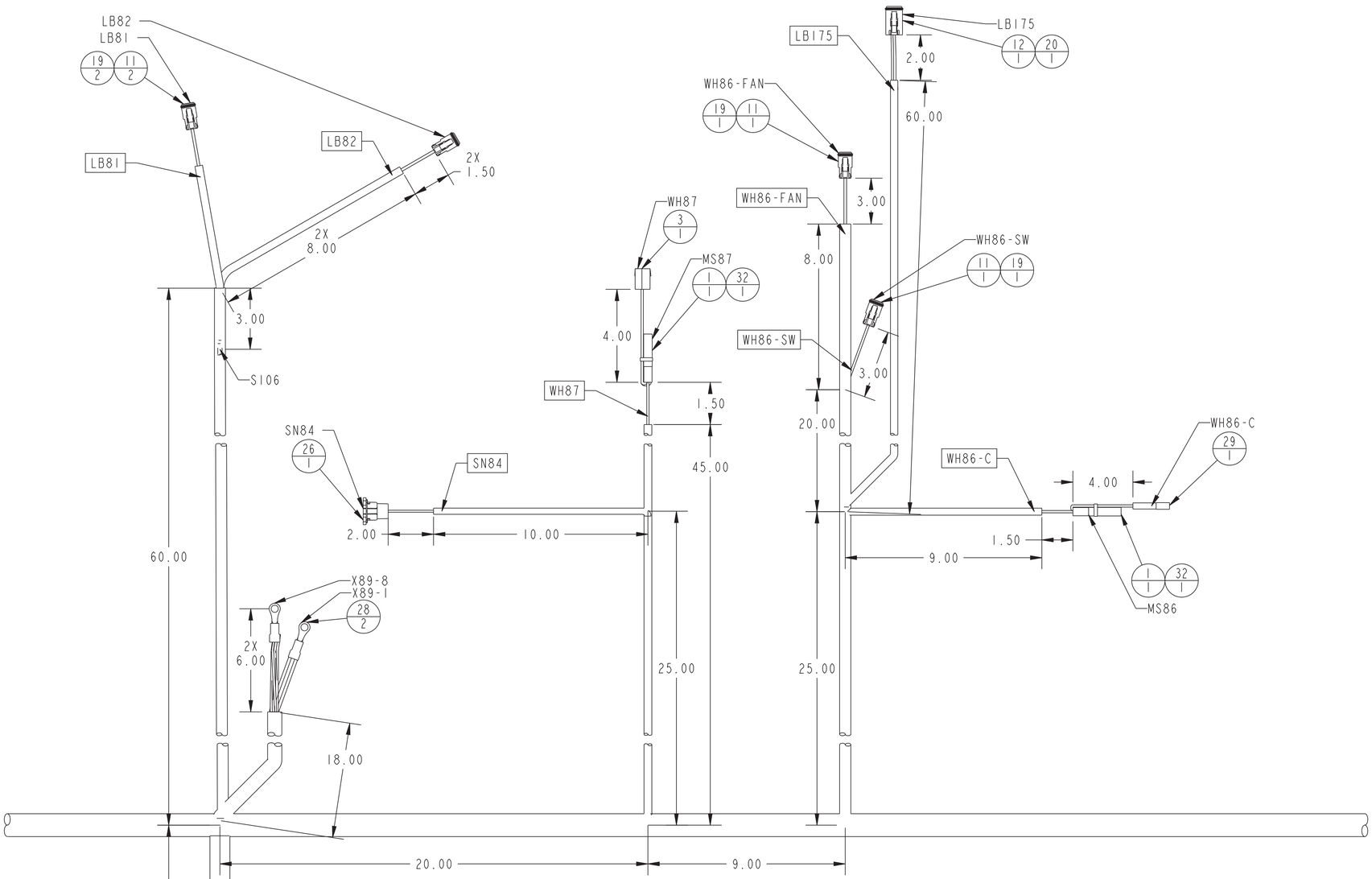
SIZE D | DWG NO. 82173009 | REV C

SCALE: 1/8 | EST WT: 6.4# | SHEET: 3 OF 8

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DRAWING NUMBER 82173009



DETAIL C
SCALE 3/8

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REV	ZONE	DATE	BY	ER NO.	DESCRIPTION	CHKD
C	ALL	02Sep15	EFF	EC150307	UPDATED ALL DIMENSIONS	RAB
B	C7 C5	31Jul15	AF	EC150284	CHANGED CONECTORS AND LEAD LENGTH AT LB81 AND LB82. CORRECTED CONECTOR DESIGNATION MS133 TO MS87.	RAB
A	ALL	15Apr15	EFF	EC150122	DRAWING REV. UPDATE SEE TABLES FOR REVISED WIRING.	AF

REVISIONS

SPECIFICATIONS

1) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2) ALL WELDING TO STRUCTURAL WELD CODE-STEEL ANSI/AWS D1.1
3) ALL DIMENSIONAL TOLERANCES ARE ± .060
4) MACHINE TOLERANCE TO BE ± .015
5) ALL ANGLES ± 1°
6) MACH. SURF. 125 MAX

NEXT ASSY 82179001

DRAWN BY:	EFF
DATE:	12-Sep-14
CHK'D BY:	AF
DATE:	12-Sep-14
ER NO.:	SO3259735-57
CAGE CODE:	
SIMILAR TO:	
FINISH COAT REQ:	N

GRADALL

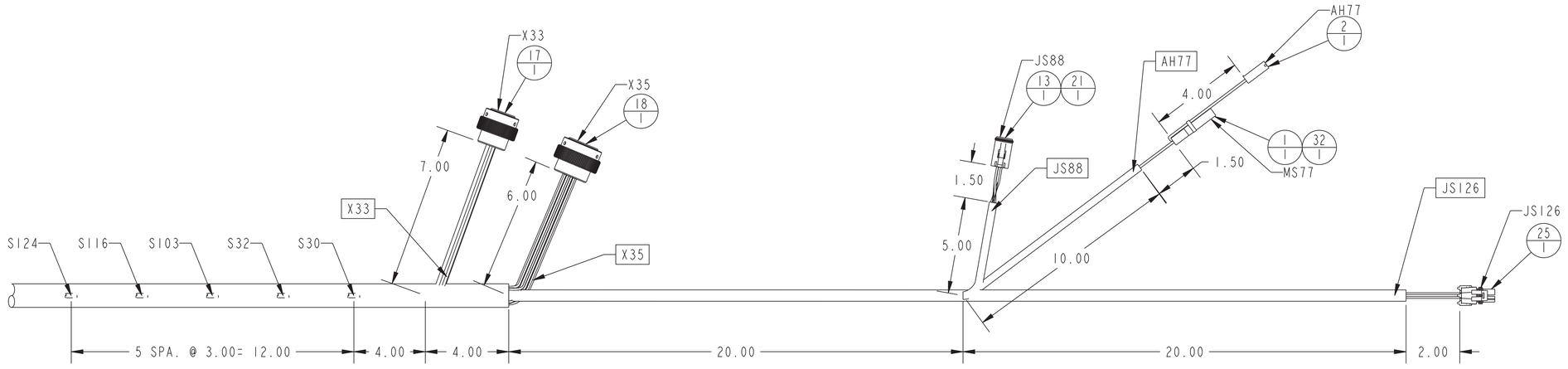
TITLE: HARNESS, UPPER

MATL: SEE PARTS LIST

SIZE D | DWG NO. 82173009 | REV C

SCALE: 3/8 | EST WT: 6.4# | SHEET: 4 OF 8

DRAWING NUMBER 82173009



DETAIL D
SCALE 3/8

REV	ZONE	DATE	BY	ER NO.	DESCRIPTION	CHKD
C	ALL	02Sep15	EFF	EC150307	REV. LEVEL UPDATE.	RAB
B	ALL	31Jul15	AF	EC150284	DRAWING REV.	RAB
A	ALL	15Apr15	EFF	EC150122	DRAWING REV. UPDATE SEE TABLES FOR REVISED WIRING.	AF

REVISIONS

SPECIFICATIONS

1) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2) ALL WELDING TO STRUCTURAL WELD CODE-STEEL ANSI/AWS D1.1
3) ALL DIMENSIONAL TOLERANCES ARE ± .060
4) MACHINE TOLERANCE TO BE ± .015
5) ALL ANGLES ± 1°
6) MACH. SURF. 125 MAX

NEXT ASSY 82179001

DRAWN BY:	EFF
DATE:	12-Sep-14
CHK'D BY:	AF
DATE:	12-Sep-14
ER NO.:	S03259735-57
CAGE CODE:	
SIMILAR TO:	
FINISH COAT REQ:	N

GRADALL

TITLE: HARNESS, UPPER

MATL: SEE PARTS LIST

SIZE D | DWG NO. 82173009 | REV C

SCALE: 1/8 | EST WT: 6.4# | SHEET: 5 OF 8

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DRAWING NUMBER 82173009

CONNECTOR PIN OUT

REV	CONNECTOR DESIGNATION	CONN POS	TERMINAL INDEX #	WIRE DESIGNATION	WIRE COLOR	STRIPE COLOR	GAUGE	TYPE	TO
	S30	1	SPLICE	CAN1-0-0	YEL	-	18 AWG	GXL	MS45-2 (4)
	S30	1	SPLICE	CAN1-0-1	YEL	-	18 AWG	GXL	S96 (2)
	S30	2	SPLICE	CAN1-0-4	YEL	-	18 AWG	GXL	X35 (26)
	S32	1	SPLICE	CAN1-0-0	GRN	-	18 AWG	GXL	MS45-2 (3)
	S32	1	SPLICE	CAN1-0-1	GRN	-	18 AWG	GXL	S97 (2)
	S32	2	SPLICE	CAN1-0-4	GRN	-	18 AWG	GXL	X35 (27)
	X33	A	DT010	BAT-107	RED	WHT	12 AWG	GXL	MS45-1 (A)
	X33	B	DT010	BAT-108	RED	WHT	12 AWG	GXL	MS45-1 (B)
	X33	C	DT010	BAT-109	RED	WHT	12 AWG	GXL	MS45-1 (C)
	X33	D	DT010	BAT-110	RED	WHT	12 AWG	GXL	MS45-1 (D)
	X33	E	DT010	GND-7	BLK	-	12 AWG	GXL	X89-7 (1)
	X33	F	DT010	GND-7	BLK	-	12 AWG	GXL	X89-7 (1)
	X33	G	DT010	BOOM LT-1-0	BLU	WHT	12 AWG	GXL	S106 (1)
	X33	H	DT010	AC FAN-301	PNK	BLK	14 AWG	GXL	WH86-FAN (1)
	X35	1	DT008	UP BAT	RED	BLK	16 AWG	GXL	MS45-2 (1)
	X35	2	DT008	IGN-1	YEL	BLK	16 AWG	GXL	MS45-2 (2)
	X35	3	DT008	BAT-201-0	RED	YEL	18 AWG	GXL	S92 (2)
	X35	4	DT009	BAT-208	RED	LBL	14 AWG	GXL	S117 (2)
	X35	5	DT009	BAT-210	RED	LBL	14 AWG	GXL	S117 (2)
A	X35	6	DT008	IGN-306-0	YEL	BLU	18 AWG	GXL	S116 (2)
A	X35	7	DT009	IGN-307-0	YEL	BRN	14 AWG	GXL	S123 (2)
	X35	8	DT008	ACC-214-0	ORG	YEL	16 AWG	GXL	S124 (2)
	X35	9	DT008	UP START SW	VIO	BLK	18 AWG	GXL	CO75-1 (48)
	X35	10	DT008	HORN-1-0	BLU	YEL	16 AWG	GXL	S103 (2)
	X35	11	DT009	WORK LT-304-0	BLU	VIO	14 AWG	GXL	S157 (1)
B	X35	12	DT008	WASH-305	PNK	YEL	16 AWG	GXL	MS87 (K)
	X35	13	DT008	FAN C	VIO	BRN	20 AWG	GXL	CO75-2 (14)
	X35	14	DT008	PILOT SW	VIO	WHT	20 AWG	GXL	CO75-2 (9)
	X35	15	DT008	CAB ALM	BRN	-	20 AWG	GXL	CO75-1 (94)
	X35	16	DT008	AC CLUTCH-1	PNK	ORG	16 AWG	GXL	WH86-SW (1)
	X35	17	DT008	AC-0-2	BRN	GRY	18 AWG	GXL	S104 (2)
	X35	18	DT009	SP-1	GRY	BLK	14 AWG	GXL	X172-1 (1)
	X35	19	DT009	SP-2	GRY	WHT	14 AWG	GXL	X172-2 (1)
	X35	20	DT009	SP-3	GRY	RED	14 AWG	GXL	X172-3 (1)
A	X35	21	DT008	TILT SPEED	WHT	GRN	20 AWG	GXL	CO75-2 (31)
A	X35	22	DT009	SP-4	GRY	YEL	14 AWG	GXL	X172-4 (1)
	X35	23	DT051	PLUG					
	X35	24	DT051	PLUG					
	X35	25	DT051	PLUG					
	X35	26	DT018	CAN1-0-4	YEL	-	18 AWG	GXL	S30 (2)
	X35	27	DT018	CAN1-0-4	GRN	-	18 AWG	GXL	S32 (2)
	X35	28	DT018	CAN2-0-1	YEL	-	18 AWG	GXL	S98 (2)
	X35	29	DT018	CAN2-0-1	GRN	-	18 AWG	GXL	S99 (2)
	X35	30	DT051	PLUG					
	X35	31	DT051	PLUG					
	MS45-1	A	DT010	BAT-107	RED	WHT	12 AWG	GXL	X33 (A)
	MS45-1	B	DT010	BAT-108	RED	WHT	12 AWG	GXL	X33 (B)
	MS45-1	C	DT010	BAT-109	RED	WHT	12 AWG	GXL	X33 (C)
	MS45-1	D	DT010	BAT-110	RED	WHT	12 AWG	GXL	X33 (D)
	MS45-1	E	DT010	GND-1	BLK	-	12 AWG	GXL	X89-1 (1)
	MS45-1	F	DT010	GND-1	BLK	-	12 AWG	GXL	X89-1 (1)
	MS45-1	G	DT010	GND-1	BLK	-	12 AWG	GXL	X89-1 (1)
	MS45-1	H	DT010	GND-1	BLK	-	12 AWG	GXL	X89-1 (1)
	MS45-2	1	DT008	UP BAT	RED	BLK	16 AWG	GXL	X35 (1)
	MS45-2	2	DT008	IGN-1	YEL	BLK	16 AWG	GXL	X35 (2)
	MS45-2	3	DT018	CAN1-0-0	GRN	-	18 AWG	GXL	S32 (1)
	MS45-2	4	DT018	CAN1-0-0	YEL	-	18 AWG	GXL	S30 (1)
	MS45-2	5	DT051	PLUG					
	MS45-2	6	DT051	PLUG					
	CO75-1	1	EMPTY	EMPTY					
	CO75-1	2	EMPTY	EMPTY					
	CO75-1	3	XT005	AUX 2	BRN	LGR	18 AWG	GXL	HV76-AUX-2 (1)
	CO75-1	4	EMPTY	EMPTY					
	CO75-1	5	EMPTY	EMPTY					
	CO75-1	6	XT005	SWING BRK	BRN	LBL	20 AWG	GXL	HV76-SW-BK (1)
	CO75-1	7	XT005	PILOT	BRN	VIO	20 AWG	GXL	HV76-PLT (1)
	CO75-1	8	EMPTY	EMPTY					
	CO75-1	9	EMPTY	EMPTY					
	CO75-1	10	EMPTY	EMPTY					
	CO75-1	11	EMPTY	EMPTY					
	CO75-1	12	EMPTY	EMPTY					
	CO75-1	13	EMPTY	EMPTY					
	CO75-1	14	EMPTY	EMPTY					
	CO75-1	15	EMPTY	EMPTY					
	CO75-1	16	EMPTY	EMPTY					
	CO75-1	17	EMPTY	EMPTY					
	CO75-1	18	EMPTY	EMPTY					
	CO75-1	19	EMPTY	EMPTY					
	CO75-1	20	EMPTY	EMPTY					

CONNECTOR PIN OUT

REV	CONNECTOR DESIGNATION	CONN POS	TERMINAL INDEX #	WIRE DESIGNATION	WIRE COLOR	STRIPE COLOR	GAUGE	TYPE	TO
	CO75-1	21	XT005	TP-HTR TEMP	WHT	ORG	20 AWG	GXL	SN84 (1)
	CO75-1	22	XT005	GND-7-3	BLK	-	20 AWG	GXL	S156 (1)
	CO75-1	23	XT005	GND-7-3	BLK	-	20 AWG	GXL	S156 (1)
	CO75-1	24	XT006	GND-7-3	BLK	-	16 AWG	GXL	S156 (1)
	CO75-1	25	EMPTY	EMPTY					
	CO75-1	26	EMPTY	EMPTY					
	CO75-1	27	EMPTY	EMPTY					
	CO75-1	28	XT005	AUX 1	BRN	BLU	18 AWG	GXL	HV76-AUX-1 (1)
	CO75-1	29	EMPTY	EMPTY					
	CO75-1	30	EMPTY	EMPTY					
	CO75-1	31	EMPTY	EMPTY					
	CO75-1	32	EMPTY	EMPTY					
	CO75-1	33	EMPTY	EMPTY					
	CO75-1	34	EMPTY	EMPTY					
	CO75-1	35	EMPTY	EMPTY					
	CO75-1	36	EMPTY	EMPTY					
	CO75-1	37	EMPTY	EMPTY					
	CO75-1	38	EMPTY	EMPTY					
	CO75-1	39	EMPTY	EMPTY					
	CO75-1	40	EMPTY	EMPTY					
	CO75-1	41	EMPTY	EMPTY					
	CO75-1	42	EMPTY	EMPTY					
	CO75-1	43	EMPTY	EMPTY					
	CO75-1	44	EMPTY	EMPTY					
	CO75-1	45	XT005	TP-HTR TEMP	BLK	ORG	20 AWG	GXL	SN84 (2)
	CO75-1	46	XT005	TP-THR	BLK	YEL	20 AWG	GXL	JS88 (2)
	CO75-1	47	XT005	HOIST UP PROX	VIO	LGR	20 AWG	GXL	SN79 (C)
	CO75-1	48	XT005	UP START SW	VIO	BLK	18 AWG	GXL	X35 (9)
	CO75-1	49	EMPTY	EMPTY					
	CO75-1	50	EMPTY	EMPTY					
	CO75-1	51	XT005	HOIST UP	BRN	ORG	18 AWG	GXL	HV76-HT-UP (1)
	CO75-1	52	EMPTY	EMPTY					
	CO75-1	53	XT005	BOOM IN	BRN	BLK	18 AWG	GXL	HV76-BM-IN (1)
A	CO75-1	54	XT005	SWING RT	BRN	RED	20 AWG	GXL	HV76-SW-RT (1)
	CO75-1	55	EMPTY	EMPTY					
	CO75-1	56	EMPTY	EMPTY					
	CO75-1	57	EMPTY	EMPTY					
	CO75-1	58	XT005	AUX 2 FT SW	VIO	BLU	20 AWG	GXL	JS126 (A)
	CO75-1	59	XT005	AUX 1 FT SW	VIO	GRN	20 AWG	GXL	JS126 (D)
	CO75-1	60	EMPTY	EMPTY					
	CO75-1	61	EMPTY	EMPTY					
	CO75-1	62	EMPTY	EMPTY					
	CO75-1	63	EMPTY	EMPTY					
	CO75-1	64	XT005	TP-THR	WHT	YEL	20 AWG	GXL	JS88 (3)
	CO75-1	65	EMPTY	EMPTY					
	CO75-1	66	EMPTY	EMPTY					
	CO75-1	67	EMPTY	EMPTY					
	CO75-1	68	EMPTY	EMPTY					
	CO75-1	69	EMPTY	EMPTY					
	CO75-1	70	EMPTY	EMPTY					
	CO75-1	71	EMPTY	EMPTY					
	CO75-1	72	EMPTY	EMPTY					
	CO75-1	73	EMPTY	EMPTY					
	CO75-1	74	EMPTY	EMPTY					
	CO75-1	75	XT005	HOIST DN	BRN	GRN	18 AWG	GXL	HV76-HT-DN (1)
	CO75-1	76	EMPTY	EMPTY					
	CO75-1	77	XT005	BOOM OUT	BRN	WHT	18 AWG	GXL	HV76-BM-OT (1)
A	CO75-1	78	XT005	SWING LT	BRN	YEL	20 AWG	GXL	HV76-SW-LT (1)
	CO75-1	79	XT005	HTR AC FLOW	TAN	ORG	20 AWG	GXL	HV85-FLW (2)
A	CO75-1	80	XT005	TOOL OP	TAN	BLK	20 AWG	GXL	HV76-TOL-OP (2)
	CO75-1	81	EMPTY	EMPTY					
	CO75-1	82	EMPTY	EMPTY					
A	CO75-1	83	EMPTY	EMPTY					
A	CO75-1	84	XT005	TOOL CL	TAN	WHT	20 AWG	GXL	HV76-TOL-CL (2)
A	CO75-1	85	XT005	TILT CCW	TAN	YEL	20 AWG	GXL	HV76-TLT-CCW (2)
A	CO75-1	86	XT005	TILT CW	TAN	RED	20 AWG	GXL	HV76-TLT-CW (2)
	CO75-1	87	EMPTY	EMPTY					
	CO75-1	88	EMPTY	EMPTY					
A	CO75-1	89	XT005	FLASH B-0-0	BLU	TAN	20 AWG	GXL	S177 (2)
A	CO75-1	90	XT005	FLASH A-0-0	BLU	LGR	20 AWG	GXL	S178 (2)
	CO75-1	91	EMPTY	EMPTY					
	CO75-1	92	EMPTY	EMPTY					
	CO75-1	93	XT005	STEER ENABLE	BRN	PNK	20 AWG	GXL	HV154 (1)
	CO75-1	94	XT005	CAB ALM	BRN	-	20 AWG	GXL	X35 (15)
	CO75-1	95	EMPTY	EMPTY					
	CO75-1	96	EMPTY	EMPTY					

CONNECTOR PIN OUT

REV	CONNECTOR DESIGNATION	CONN POS	TERMINAL INDEX #	WIRE DESIGNATION	WIRE COLOR	STRIPE COLOR	GAUGE	TYPE	TO
	CO75-2	1	XT007	BAT-208 210	RED	LBL	16 AWG	GXL	S117 (1)
	CO75-2	2	XT007	GND-7-3	BLK	-	16 AWG	GXL	S156 (1)
	CO75-2	3	XT007	BAT-208 210	RED	LBL	16 AWG	GXL	S117 (1)
	CO75-2	4	XT007	BAT-208 210	RED	LBL	16 AWG	GXL	S117 (1)
	CO75-2	5	XT007	BAT-208 210	RED	LBL	16 AWG	GXL	S117 (1)
	CO75-2	6	XT007	BAT-208 210	RED	LBL	16 AWG	GXL	S117 (1)
	CO75-2	7	XT006	GND-7-3	BLK	-	16 AWG	GXL	S156 (1)
	CO75-2	8	EMPTY	EMPTY					
	CO75-2	9	XT005	PILOT SW	VIO	WHT	20 AWG	GXL	X35 (14)
	CO75-2	10	EMPTY	EMPTY					
	CO75-2	11	EMPTY	EMPTY					
	CO75-2	12	EMPTY	EMPTY					
	CO75-2	13	EMPTY	EMPTY					
	CO75-2	14	XT005	FAN C	VIO	BRN	20 AWG	GXL	X35 (13)
	CO75-2	15	XT005	CAN1-0-2	YEL	-	20 AWG	GXL	S96 (1)
	CO75-2	16	XT005	CAN1-0-2	GRN	-	20 AWG	GXL	S97 (1)
	CO75-2	17	EMPTY	EMPTY					
	CO75-2	18	EMPTY	EMPTY					
	CO75-2	19	EMPTY	EMPTY					
	CO75-2	20	XT006	GND-7-3	BLK	-	16 AWG	GXL	S156 (1)
	CO75-2	21	EMPTY	EMPTY					
	CO75-2	22	EMPTY	EMPTY					
	CO75-2	23	EMPTY	EMPTY					
	CO75-2	24	EMPTY	EMPTY					
	CO75-2	25	EMPTY	EMPTY					
	CO75-2	26	EMPTY	EMPTY					
	CO75-2	27	EMPTY	EMPTY					
	CO75-2	28	XT005	ACC-214-1	ORG	YEL	20 AWG	GXL	S124 (1)
	CO75-2	29	EMPTY	EMPTY					
	CO75-2	30	EMPTY	EMPTY					
A	CO75-2	31	XT005	TILT SPEED	WHT	GRN	20 AWG	GXL	X35 (21)
	CO75-2	32	EMPTY	EMPTY					
	CO75-2	33	XT006	GND-7-3	BLK	-	16 AWG	GXL	S156 (1)
	CO75-2	34	EMPTY	EMPTY					
	CO75-2	35	EMPTY	EMPTY					
	CO75-2	36	XT005	REV SW	VIO	YEL	20 AWG	GXL	JS88 (5)
	CO75-2	37	EMPTY	EMPTY					
	CO75-2	38	EMPTY	EMPTY					
	CO75-2	39	EMPTY	EMPTY					
A	CO75-2	40	XT005	IGN-306-1	YEL	BLU	20 AWG	GXL	S116 (1)
A	CO75-2	41	XT005	AC-0-0	BRN	GRY	20 AWG	GXL	S104 (1)
	CO75-2	42	EMPTY	EMPTY					
A	CO75-2	43	XT005	HEATER	BRN	TAN	20 AWG	GXL	HV85-HTR (1)
	CO75-2	44	EMPTY	EMPTY					
	CO75-2	45	XT005	BAT-201-1	RED	YEL	20 AWG	GXL	S92 (1)
	CO75-2	46	XT006	GND-7-3	BLK	-	16 AWG	GXL	S156 (1)
	CO75-2	47	EMPTY	EMPTY					
	CO75-2	48	EMPTY	EMPTY					
	CO75-2	49	EMPTY	EMPTY					
	CO75-2	50	XT005	FWD SW	VIO	RED	20 AWG	GXL	JS88 (4)
	CO75-2	51	EMPTY	EMPTY					
	CO75-2	52	EMPTY	EMPTY					
	CO75-2	53	XT005	CAN2-0-0	YEL	-	20 AWG	GXL	S98 (1)
	CO75-2	54	XT005	CAN2-0-0	GRN	-	20 AWG	GXL	S99 (1)
	CO75-2	55	EMPTY	EMPTY					
	CO75-2	56	EMPTY	EMPTY					
	CO75-2	57	EMPTY	EMPTY					
	CO75-2	58	XT005	BAT-201-2	RED	YEL	20 AWG	GXL	S92 (1)
	HV76-AUX-1	1	DT008	AUX 1	BRN	BLU	18 AWG	GXL	CO75-1 (28)
	HV76-AUX-1	2	DT008	GND-7-2	BLK	-	18 AWG	GXL	S155 (1)
	HV76-AUX-2	1	DT008	AUX 2	BRN	LGR	18 AWG	GXL	CO75-1 (3)
	HV76-AUX-2	2	DT008	GND-7-2	BLK	-	18 AWG	GXL	S155 (1)
	HV76-BM-IN	1	DT008	BOOM IN	BRN	BLK	18 AWG	GXL	CO75-1 (53)
	HV76-BM-IN	2	DT008	GND-7-1	BLK	-	18 AWG	GXL	S153 (1)
	HV76-BM-OT	1	DT008	BOOM OUT	BRN	WHT	18 AWG	GXL	CO75-1 (77)
	HV76-BM-OT	2	DT008	GND-7-1	BLK	-	18 AWG	GXL	S153 (1)
	HV76-HT-DN	1	DT008	HOIST DN	BRN	GRN	18 AWG	GXL	CO75-1 (75)
	HV76-HT-DN	2	DT008	GND-7-1	BLK	-	18 AWG	GXL	S153 (1)

CONNECTOR PIN OUT

REV	CONNECTOR DESIGNATION	CONN POS	TERMINAL INDEX #	WIRE DESIGNATION	WIRE COLOR	STRIPE COLOR	GAUGE	TYPE	TO
	HV76-HT-UP	1	DT008	HOIST UP	BRN	ORG	18 AWG	GXL	CO75-1 (51)
	HV76-HT-UP	2	DT008	GND-7-1	BLK	-	18 AWG	GXL	S153 (1)
	HV76-PLT	1	DT008	PILOT	BRN	VIO	20 AWG	GXL	CO75-1 (7)
	HV76-PLT	2	DT008	GND-7-2	BLK	-	20 AWG	GXL	S155 (1)
	HV76-SW-BK	1	DT008	SWING BRK	BRN	LBL	20 AWG	GXL	CO75-1 (6)
	HV76-SW-BK	2	DT008	GND-7-2	BLK	-	20 AWG	GXL	S155 (1)
A	HV76-SW-LT	1	DT008	SWING LT	BRN	YEL	20 AWG	GXL	CO75-1 (78)
A	HV76-SW-LT	2	DT008	GND-7-1	BLK	-	20 AWG	GXL	S153 (1)
A	HV76-SW-RT	1	DT008	SWING RT	BRN	RED	20 AWG	GXL	CO75-1 (54)
A	HV76-SW-RT	2	DT008	GND-7-1	BLK	-	20 AWG	GXL	S153 (1)
A	HV76-TLT-CCW	1	DT008	IGN-307-4	YEL	BRN	20 AWG	GXL	S123 (1)
A	HV76-TLT-CCW	2	DT008	TILT CCW	TAN	YEL	20 AWG	GXL	CO75-1 (85)
A	HV76-TLT-CW	1	DT008	IGN-307-3	YEL	BRN	20 AWG	GXL	S123 (1)
A	HV76-TLT-CW	2	DT008	TILT CW	TAN	RED	20 AWG	GXL	CO75-1 (86)
A	HV76-TOL-CL	1	DT008	IGN-307-2	YEL	BRN	20 AWG	GXL	S123 (2)
A	HV76-TOL-CL	2	DT008	TOOL CL	TAN	WHT	20 AWG	GXL	CO75-1 (84)
A	HV76-TOL-OP	1	DT008	IGN-307-1	YEL	BRN	20 AWG	GXL	S123 (2)
	HV76-TOL-OP	2	DT008	TOOL OP	TAN	BLK	20 AWG	GXL	CO75-1 (80)
	AH77	1	AT002	HORN-1-1	BLU	YEL	16 AWG	GXL	MS77 (K)
	MS77	A	BUL	GND-8	BLK	-	16 AWG	GXL	X89-8 (1)
	MS77	K	BUL	HORN-1-1	BLU	YEL	16 AWG	GXL	AH77 (1)
	MS77	K	BUL	HORN-1-1	BLU	YEL	16 AWG	GXL	S103 (2)
	AH78	1	AT002	HORN-1-2	BLU	YEL	16 AWG	GXL	MS78 (K)
	MS78	A	BUL	GND-8	BLK	-	16 AWG	GXL	X89-8 (1)
	MS78	K	BUL	HORN-1-2	BLU	YEL	16 AWG	GXL	AH78 (1)
	MS78	K	BUL	HORN-1-2	BLU	YEL	16 AWG	GXL	S103 (1)
A	SN79	A	PT010	IGN-306-3	YEL	BLU	18 AWG	GXL	S116 (1)
	SN79	B	PT010	GND-8	BLK	-	18 AWG	GXL	X89-8 (1)
	SN79	C	PT009	HOIST UP PROX	VIO	LGR	20 AWG	GXL	CO75-1 (47)
B	LB80	1	DT009	WORK LT-304-1	BLU	VIO	14 AWG	GXL	S157 (2)
B	LB80	2	DT009	GND-9	BLK	-	14 AWG	GXL	X89-9 (1)
B	LB81	1	DT009	BOOM LT-1-1	BLU	WHT	14 AWG	GXL	S106 (2)
B	LB81	2	DT009	GND-9	BLK	-	14 AWG	GXL	X89-9 (1)
B	LB82	1	DT009	BOOM LT-1-2	BLU	WHT	14 AWG	GXL	S106 (2)
B	LB82	2	DT009	GND-9	BLK	-	14 AWG	GXL	X89-9 (1)
	SN84	1	PT046	TP-HTR TEMP	WHT	ORG	20 AWG	GXL	CO75-1 (21)
	SN84	2	PT046	TP-HTR TEMP	BLK	ORG	20 AWG	GXL	CO75-1 (45)
	HV85-AC	1	DT008	AC-0-1	BRN	GRY	18 AWG	GXL	S104 (2)
	HV85-AC	2	DT008	GND-7-2	BLK	-	18 AWG	GXL	S155 (2)
A	HV85-FLW	1	DT008	IGN-307-5	YEL	BRN	20 AWG	GXL	S123 (2)
	HV85-FLW	2	DT008	HTR AC FLOW	TAN	ORG	20 AWG	GXL	CO75-1 (79)
A	HV85-HTR	1	DT008	HEATER	BRN	TAN	20 AWG	GXL	CO75-2 (43)
	HV85-HTR	2	DT008	GND-7-2	BLK	-	20 AWG	GXL	S155 (2)
	MS86	A	BUL	GND-9	BLK	-	16 AWG	GXL	X89-9 (1)
	MS86	K	BUL	AC CLUTCH-2	PNK	GRN	16 AWG	GXL	WH86-C (1)
	MS86	K	BUL	AC CLUTCH-2	PNK	GRN	16 AWG	GXL	WH86-SW (2)
	WH86-C	1	BUL	AC CLUTCH-2	PNK	GRN	16 AWG	GXL	MS86 (K)
	WH86-FAN	1	DT009	AC FAN-301	PNK	BLK	14 AWG	GXL	X33 (H)
	WH86-FAN	2	DT009	GND-8	BLK	-	14 AWG	GXL	X89-8 (1)
	WH86-SW	1	DT008	AC CLUTCH-1	PNK	ORG	16 AWG	GXL	X35 (16)
	WH86-SW	2	DT008	AC CLUTCH-2	PNK	GRN	16 AWG	GXL	MS86 (K)
B	MS87	A	BUL	GND-9	BLK	-	16 AWG	GXL	WH87 (2)
B	MS87	A	BUL	GND-9	BLK	-	16 AWG	GXL	X89-9 (1)
B	MS87	K	BUL	WASH-305	PNK	YEL	16 AWG	GXL	WH87 (1)
B	MS87	K	BUL	WASH-305	PNK	YEL	16 AWG	GXL	X35 (12)
B	WH87	1	AT010	WASH-305	PNK	YEL	16 AWG	GXL	MS87 (K)
B	WH87	2	AT010	GND-9	BLK	-	16 AWG	GXL	MS87 (A)
A	JS88	1	DT008	IGN-306-2	YEL	BLU	18 AWG	GXL	S116 (2)
	JS88	2	DT008	TP-THR	BLK	YEL	20 AWG	GXL	CO75-1 (46)
	JS88	3	DT008	TP-THR	WHT	YEL	20 AWG	GXL	CO75-1 (64)
	JS88	4	DT008	FWD SW	VIO	RED	20 AWG	GXL	CO75-2 (50)
	JS88	5	DT008	REV SW	VIO	YEL	20 AWG	GXL	CO75-2 (36)
	JS88	6	DT051	PLUG					
	X89-1	1	RING	GND-1	BLK	-	12 AWG	GXL	MS45-1 (E)
	X89-1	1	RING	GND-1	BLK	-	12 AWG	GXL	MS45-1 (F)
	X89-1	1	RING	GND-1	BLK	-	12 AWG	GXL	MS45-1 (G)
	X89-1	1	RING	GND-1	BLK	-	12 AWG	GXL	MS45-1 (H)
	X89-7	1	RING	GND-7-1	BLK	-	12 AWG	GXL	S153 (2)

UNLESS OTHERWISE NOTED:
1) THIS IS A PRO ENGINEER / WINDCHILL CONTROLLED DOCUMENT.
2) ALL DIMENSIONS ARE IN INCHES.

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REV	ZONE	DATE	BY	ER NO.	DESCRIPTION	CHKD
C	ALL	02Sep15	EFF	EC150307	REV. LEVEL UPDATE.	RAB
B	ALL	31Jul15	AF	EC150284	UPDATED REVISED ITEMS ON TABLES	RAB
A	ALL	15Apr15	EFF	EC150122	UPDATED REVISED ITEMS ON TABLES	AF

REVISIONS

SPECIFICATIONS

1) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2) ALL WELDING TO STRUCTURAL WELD CODE-STEEL ANSI/AWS D1.1
3) ALL DIMENSIONAL TOLERANCES ARE ± .060
4) MACHINE TOLERANCE TO BE ± .015
5) ALL ANGLES ± 1°
6) MACH. SURF. 125 MAX

NEXT ASSY 82179001

DRAWN BY:	EFF
DATE:	12-Sep-14
CHK'D BY:	AF
DATE:	12-Sep-14
ER NO.:	S03259735-57
CAGE CODE:	
SIMILAR TO:	
FINISH COAT REQ:	N

GRADALL

TITLE: HARNESS, UPPER

MATL: SEE PARTS LIST

SIZE D | DWG NO. 82173009 | REV C

SCALE: 1/32 | EST WT: 18.4# | SHEET: 6 OF 8

DRAWING NUMBER
82173009

CONNECTOR PIN OUT

REV	CONNECTOR DESIGNATION	CONN POS	TERMINAL INDEX #	WIRE DESIGNATION	WIRE COLOR	STRIPE COLOR	GAUGE	TYPE	TO
	X89-7	1	RING	GND-7-2	BLK	-	12 AWG	GXL	S155 (2)
	X89-7	1	RING	GND-7-3	BLK	-	10 AWG	GXL	S156 (2)
	X89-7	1	RING	GND-7	BLK	-	12 AWG	GXL	X33 (E)
	X89-7	1	RING	GND-7	BLK	-	12 AWG	GXL	X33 (F)
	X89-8	1	RING	GND-8	BLK	-	16 AWG	GXL	MS77 (A)
	X89-8	1	RING	GND-8	BLK	-	16 AWG	GXL	MS78 (A)
	X89-8	1	RING	GND-8	BLK	-	18 AWG	GXL	SN79 (B)
	X89-8	1	RING	GND-8	BLK	-	14 AWG	GXL	WH86-FAN (2)
	X89-8	1	RING	GND-8	BLK	-	14 AWG	GXL	X172-5 (1)
	X89-8	1	RING	GND-8	BLK	-	14 AWG	GXL	X172-6 (1)
	X89-8	1	RING	GND-8	BLK	-	14 AWG	GXL	X172-7 (1)
B	X89-9	1	RING	GND-9	BLK	-	14 AWG	GXL	LB137 (2)
	X89-9	1	RING	GND-9	BLK	-	16 AWG	GXL	LB175 (4)
	X89-9	1	RING	GND-9	BLK	-	16 AWG	GXL	LB176 (4)
B	X89-9	1	RING	GND-9	BLK	-	14 AWG	GXL	LB80 (2)
	X89-9	1	RING	GND-9	BLK	-	14 AWG	GXL	LB81 (2)
	X89-9	1	RING	GND-9	BLK	-	14 AWG	GXL	LB82 (2)
	X89-9	1	RING	GND-9	BLK	-	16 AWG	GXL	MS86 (A)
B	X89-9	1	RING	GND-9	BLK	-	16 AWG	GXL	MS87 (A)
	S92	1	SPLICE	BAT-201-1	RED	YEL	20 AWG	GXL	CO75-2 (45)
	S92	1	SPLICE	BAT-201-2	RED	YEL	20 AWG	GXL	CO75-2 (58)
	S92	2	SPLICE	BAT-201-0	RED	YEL	18 AWG	GXL	X35 (3)
	X94	1	DT017	CAN2-0-2	YEL	-	18 AWG	GXL	S98 (1)
	X94	2	DT017	CAN2-0-2	GRN	-	18 AWG	GXL	S99 (1)
	X95	1	DT017	CAN1-0-3	YEL	-	18 AWG	GXL	S96 (1)
	X95	2	DT017	CAN1-0-3	GRN	-	18 AWG	GXL	S97 (1)
	S96	1	SPLICE	CAN1-0-2	YEL	-	20 AWG	GXL	CO75-2 (15)
	S96	1	SPLICE	CAN1-0-3	YEL	-	18 AWG	GXL	X95 (1)
	S96	2	SPLICE	CAN1-0-1	YEL	-	18 AWG	GXL	S30 (1)
	S97	1	SPLICE	CAN1-0-2	GRN	-	20 AWG	GXL	CO75-2 (16)
	S97	1	SPLICE	CAN1-0-3	GRN	-	18 AWG	GXL	X95 (2)
	S97	2	SPLICE	CAN1-0-1	GRN	-	18 AWG	GXL	S32 (1)
	S98	1	SPLICE	CAN2-0-0	YEL	-	20 AWG	GXL	CO75-2 (53)
	S98	1	SPLICE	CAN2-0-2	YEL	-	18 AWG	GXL	X94 (1)
	S98	2	SPLICE	CAN2-0-1	YEL	-	18 AWG	GXL	X35 (28)
	S99	1	SPLICE	CAN2-0-0	GRN	-	20 AWG	GXL	CO75-2 (54)
	S99	1	SPLICE	CAN2-0-2	GRN	-	18 AWG	GXL	X94 (2)
	S99	2	SPLICE	CAN2-0-1	GRN	-	18 AWG	GXL	X35 (29)
	S103	1	SPLICE	HORN-1-2	BLU	YEL	16 AWG	GXL	MS78 (K)
	S103	2	SPLICE	HORN-1-1	BLU	YEL	16 AWG	GXL	MS77 (K)
	S103	2	SPLICE	HORN-1-0	BLU	YEL	16 AWG	GXL	X35 (10)
A	S104	1	SPLICE	AC-0-0	BRN	GRY	20 AWG	GXL	CO75-2 (41)
	S104	2	SPLICE	AC-0-1	BRN	GRY	18 AWG	GXL	HV85-AC (1)
	S104	2	SPLICE	AC-0-2	BRN	GRY	18 AWG	GXL	X35 (17)
	S106	1	SPLICE	BOOM LT-1-0	BLU	WHT	12 AWG	GXL	X33 (G)
	S106	2	SPLICE	BOOM LT-1-1	BLU	WHT	14 AWG	GXL	LB81 (1)
	S106	2	SPLICE	BOOM LT-1-2	BLU	WHT	14 AWG	GXL	LB82 (1)
A	S116	1	SPLICE	IGN-306-1	YEL	BLU	20 AWG	GXL	CO75-2 (40)
A	S116	1	SPLICE	IGN-306-3	YEL	BLU	18 AWG	GXL	SN79 (A)
A	S116	2	SPLICE	IGN-306-2	YEL	BLU	18 AWG	GXL	JS88 (1)
A	S116	2	SPLICE	IGN-306-0	YEL	BLU	18 AWG	GXL	X35 (6)
	S117	1	SPLICE	BAT-208 210	RED	LBL	16 AWG	GXL	CO75-2 (1)
	S117	1	SPLICE	BAT-208 210	RED	LBL	16 AWG	GXL	CO75-2 (3)
	S117	1	SPLICE	BAT-208 210	RED	LBL	16 AWG	GXL	CO75-2 (4)
	S117	1	SPLICE	BAT-208 210	RED	LBL	16 AWG	GXL	CO75-2 (5)
	S117	1	SPLICE	BAT-208 210	RED	LBL	16 AWG	GXL	CO75-2 (6)
	S117	2	SPLICE	BAT-208	RED	LBL	14 AWG	GXL	X35 (4)
	S117	2	SPLICE	BAT-210	RED	LBL	14 AWG	GXL	X35 (5)
A	S123	1	SPLICE	IGN-307-4	YEL	BRN	20 AWG	GXL	HV76-TLT-CCW (1)
A	S123	1	SPLICE	IGN-307-3	YEL	BRN	20 AWG	GXL	HV76-TLT-CW (1)
A	S123	2	SPLICE	IGN-307-2	YEL	BRN	20 AWG	GXL	HV76-TOL-CL (1)
A	S123	2	SPLICE	IGN-307-1	YEL	BRN	20 AWG	GXL	HV76-TOL-OP (1)
A	S123	2	SPLICE	IGN-307-5	YEL	BRN	20 AWG	GXL	HV85-FLW (1)
A	S123	2	SPLICE	IGN-307-0	YEL	BRN	14 AWG	GXL	X35 (7)

CONNECTOR PIN OUT

REV	CONNECTOR DESIGNATION	CONN POS	TERMINAL INDEX #	WIRE DESIGNATION	WIRE COLOR	STRIPE COLOR	GAUGE	TYPE	TO
	S124	1	SPLICE	ACC-214-1	ORG	YEL	20 AWG	GXL	CO75-2 (28)
	S124	2	SPLICE	ACC-214-3	ORG	YEL	18 AWG	GXL	JS126 (B)
	S124	2	SPLICE	ACC-214-4	ORG	YEL	18 AWG	GXL	JS126 (C)
	S124	2	SPLICE	ACC-214-0	ORG	YEL	16 AWG	GXL	X35 (8)
	JS126	A	PT009	AUX 2 FT SW	VIO	BLU	20 AWG	GXL	CO75-1 (58)
	JS126	B	PT010	ACC-214-3	ORG	YEL	18 AWG	GXL	S124 (2)
	JS126	C	PT010	ACC-214-4	ORG	YEL	18 AWG	GXL	S124 (2)
	JS126	D	PT009	AUX 1 FT SW	VIO	GRN	20 AWG	GXL	CO75-1 (59)
B	LB137	1	DT009	WORK LT-304-2	BLU	VIO	14 AWG	GXL	S157 (2)
B	LB137	2	DT009	GND-9	BLK	-	14 AWG	GXL	X89-9 (1)
	S153	1	SPLICE	GND-7-1	BLK	-	18 AWG	GXL	HV76-BM-IN (2)
	S153	1	SPLICE	GND-7-1	BLK	-	18 AWG	GXL	HV76-BM-OT (2)
	S153	1	SPLICE	GND-7-1	BLK	-	18 AWG	GXL	HV76-HT-DN (2)
	S153	1	SPLICE	GND-7-1	BLK	-	18 AWG	GXL	HV76-HT-UP (2)
A	S153	1	SPLICE	GND-7-1	BLK	-	20 AWG	GXL	HV76-SW-LT (2)
A	S153	1	SPLICE	GND-7-1	BLK	-	20 AWG	GXL	HV76-SW-RT (2)
	S153	2	SPLICE	GND-7-1	BLK	-	12 AWG	GXL	X89-7 (1)
	HV154	1	DT008	STEER ENABLE	BRN	PNK	20 AWG	GXL	CO75-1 (93)
	HV154	2	DT008	GND-7-2	BLK	-	20 AWG	GXL	S155 (1)
	S155	1	SPLICE	GND-7-2	BLK	-	20 AWG	GXL	HV154 (2)
	S155	1	SPLICE	GND-7-2	BLK	-	18 AWG	GXL	HV76-AUX-1 (2)
	S155	1	SPLICE	GND-7-2	BLK	-	18 AWG	GXL	HV76-AUX-2 (2)
	S155	1	SPLICE	GND-7-2	BLK	-	20 AWG	GXL	HV76-PLT (2)
	S155	1	SPLICE	GND-7-2	BLK	-	20 AWG	GXL	HV76-SW-BK (2)
	S155	2	SPLICE	GND-7-2	BLK	-	18 AWG	GXL	HV85-AC (2)
	S155	2	SPLICE	GND-7-2	BLK	-	20 AWG	GXL	HV85-HTR (2)
	S155	2	SPLICE	GND-7-2	BLK	-	12 AWG	GXL	X89-7 (1)
	S156	1	SPLICE	GND-7-3	BLK	-	20 AWG	GXL	CO75-1 (22)
	S156	1	SPLICE	GND-7-3	BLK	-	20 AWG	GXL	CO75-1 (23)
	S156	1	SPLICE	GND-7-3	BLK	-	16 AWG	GXL	CO75-1 (24)
	S156	1	SPLICE	GND-7-3	BLK	-	16 AWG	GXL	CO75-2 (2)
	S156	1	SPLICE	GND-7-3	BLK	-	16 AWG	GXL	CO75-2 (20)
	S156	1	SPLICE	GND-7-3	BLK	-	16 AWG	GXL	CO75-2 (33)
	S156	1	SPLICE	GND-7-3	BLK	-	16 AWG	GXL	CO75-2 (46)
	S156	1	SPLICE	GND-7-3	BLK	-	16 AWG	GXL	CO75-2 (7)
	S156	2	SPLICE	GND-7-3	BLK	-	10 AWG	GXL	X89-7 (1)
	S157	1	SPLICE	WORK LT-304-0	BLU	VIO	14 AWG	GXL	X35 (11)
B	S157	2	SPLICE	WORK LT-304-2	BLU	VIO	14 AWG	GXL	LB137 (1)
B	S157	2	SPLICE	WORK LT-304-1	BLU	VIO	14 AWG	GXL	LB80 (1)
	X172-1	1	SHRINK	SP-1	GRY	BLK	14 AWG	GXL	X35 (18)
	X172-2	1	SHRINK	SP-2	GRY	WHT	14 AWG	GXL	X35 (19)
	X172-3	1	SHRINK	SP-3	GRY	RED	14 AWG	GXL	X35 (20)
A	X172-4	1	SHRINK	SP-4	GRY	YEL	14 AWG	GXL	X35 (22)
	X172-5	1	SHRINK	GND-8	BLK	-	14 AWG	GXL	X89-8 (1)
	X172-6	1	SHRINK	GND-8	BLK	-	14 AWG	GXL	X89-8 (1)
	X172-7	1	SHRINK	GND-8	BLK	-	14 AWG	GXL	X89-8 (1)
	LB175	1	DT008	FLASH B-0-2	BLU	TAN	16 AWG	GXL	S177 (1)
	LB175	2	DT008	FLASH A-0-2	BLU	LGR	16 AWG	GXL	S178 (1)
	LB175	3	DT051	PLUG					
	LB175	4	DT008	GND-9	BLK	-	16 AWG	GXL	X89-9 (1)
	LB176	1	DT008	FLASH B-0-1	BLU	TAN	16 AWG	GXL	S177 (2)
	LB176	2	DT008	FLASH A-0-1	BLU	LGR	16 AWG	GXL	S178 (2)
	LB176	3	DT051	PLUG					
	LB176	4	DT008	GND-9	BLK	-	16 AWG	GXL	X89-9 (1)
	S177	1	SPLICE	FLASH B-0-2	BLU	TAN	16 AWG	GXL	LB175 (1)
A	S177	2	SPLICE	FLASH B-0-0	BLU	TAN	20 AWG	GXL	CO75-1 (89)
	S177	2	SPLICE	FLASH B-0-1	BLU	TAN	16 AWG	GXL	LB176 (1)
	S178	1	SPLICE	FLASH A-0-2	BLU	LGR	16 AWG	GXL	LB175 (2)
A	S178	2	SPLICE	FLASH A-0-0	BLU	LGR	20 AWG	GXL	CO75-1 (90)
	S178	2	SPLICE	FLASH A-0-1	BLU	LGR	16 AWG	GXL	LB176 (2)

UNLESS OTHERWISE NOTED:
1) THIS IS A PRO ENGINEER / WINDCHILL CONTROLLED DOCUMENT.
2) ALL DIMENSIONS ARE IN INCHES.

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REV	ZONE	DATE	BY	ER NO.	DESCRIPTION	CHKD
C	ALL	02Sep15	EFF	EC150307	REV. LEVEL UPDATE.	RAB
B	ALL	31Jul15	AF	EC150284	UPDATED REVISED ITEMS ON TABLES	RAB
A	ALL	15Apr15	EFF	EC150122	UPDATED REVISED ITEMS ON TABLES	AF

REVISIONS

SPECIFICATIONS

1) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2) ALL WELDING TO STRUCTURAL WELD CODE-STEEL ANSI/AWS D1.1
3) ALL DIMENSIONAL TOLERANCES ARE ± .060
4) MACHINE TOLERANCE TO BE ± .015
5) ALL ANGLES ± 1°
6) MACH. SURF. 125 MAX

NEXT ASSY 82179001

DRAWN BY:	EFF
DATE:	12-Sep-14
CHK'D BY:	AF
DATE:	12-Sep-14
ER NO.:	SO3259735-57
CAGE CODE:	
SIMILAR TO:	
FINISH COAT REQ:	N

GRADALL

TITLE: HARNESS, UPPER

MATL: SEE PARTS LIST

SIZE D | DWG NO. 82173009 | REV C

SCALE: 1/32 | EST WT: 18.4# | SHEET: 7 OF 8

DRAWING NUMBER
82173009

FROM-TO WIRE LIST

REV	WIRE NAME (REF ONLY)	WIRE DESIGNATION	FROM CONNECTOR	FROM PIN	FROM TERM INDEX #	TO CONNECTOR	TO PIN	TO TERM INDEX #	WIRE COLOR	STRIPE COLOR	GAUGE	TYPE
	WIRE_128	AC CLUTCH-1	X35	16	DT008	WH86-SW	1	DT008	PNK	ORG	16 AWG	GXL
	WIRE_129	AC CLUTCH-2	WH86-C	1	BUL	MS86	K	BUL	PNK	GRN	16 AWG	GXL
	WIRE_207	AC CLUTCH-2	WH86-SW	2	DT008	MS86	K	BUL	PNK	GRN	16 AWG	GXL
	WIRE_206	AC FAN-301	X33	H	DT010	WH86-FAN	1	DT009	PNK	BLK	14 AWG	GXL
A	WIRE_280	AC-0-0	CO75-2	41	XT005	S104	1	SPLICE	BRN	GRY	20 AWG	GXL
	WIRE_279	AC-0-1	HV85-AC	1	DT008	S104	2	SPLICE	BRN	GRY	18 AWG	GXL
	WIRE_205	AC-0-2	S104	2	SPLICE	X35	17	DT008	BRN	GRY	18 AWG	GXL
	WIRE_204	ACC-214-0	S124	2	SPLICE	X35	8	DT008	ORG	YEL	16 AWG	GXL
	WIRE_278	ACC-214-1	CO75-2	28	XT005	S124	1	SPLICE	ORG	YEL	20 AWG	GXL
	WIRE_277	ACC-214-3	JS126	B	PT010	S124	2	SPLICE	ORG	YEL	18 AWG	GXL
	WIRE_276	ACC-214-4	JS126	C	PT010	S124	2	SPLICE	ORG	YEL	18 AWG	GXL
	WIRE_274	AUX 1	CO75-1	28	XT005	HV76-AUX-1	1	DT008	BRN	BLU	18 AWG	GXL
	WIRE_275	AUX 1 FT SW	JS126	D	PT009	CO75-1	59	XT005	VIO	GRN	20 AWG	GXL
	WIRE_272	AUX 2	CO75-1	3	XT005	HV76-AUX-2	1	DT008	BRN	LGR	18 AWG	GXL
	WIRE_273	AUX 2 FT SW	JS126	A	PT009	CO75-1	58	XT005	VIO	BLU	20 AWG	GXL
	WIRE_203	BAT-107	MS45-1	A	DT010	X33	A	DT010	RED	WHT	12 AWG	GXL
	WIRE_202	BAT-108	MS45-1	B	DT010	X33	B	DT010	RED	WHT	12 AWG	GXL
	WIRE_201	BAT-109	MS45-1	C	DT010	X33	C	DT010	RED	WHT	12 AWG	GXL
	WIRE_200	BAT-110	MS45-1	D	DT010	X33	D	DT010	RED	WHT	12 AWG	GXL
	WIRE_199	BAT-201-0	S92	2	SPLICE	X35	3	DT008	RED	YEL	18 AWG	GXL
	WIRE_271	BAT-201-1	CO75-2	45	XT005	S92	1	SPLICE	RED	YEL	20 AWG	GXL
	WIRE_270	BAT-201-2	CO75-2	58	XT005	S92	1	SPLICE	RED	YEL	20 AWG	GXL
	WIRE_198	BAT-208	S117	2	SPLICE	X35	4	DT009	RED	LBL	14 AWG	GXL
	WIRE_269	BAT-208 210	CO75-2	1	XT007	S117	1	SPLICE	RED	LBL	16 AWG	GXL
	WIRE_268	BAT-208 210	CO75-2	3	XT007	S117	1	SPLICE	RED	LBL	16 AWG	GXL
	WIRE_267	BAT-208 210	CO75-2	4	XT007	S117	1	SPLICE	RED	LBL	16 AWG	GXL
	WIRE_265	BAT-208 210	CO75-2	5	XT007	S117	1	SPLICE	RED	LBL	16 AWG	GXL
	WIRE_266	BAT-208 210	CO75-2	6	XT007	S117	1	SPLICE	RED	LBL	16 AWG	GXL
	WIRE_197	BAT-210	S117	2	SPLICE	X35	5	DT009	RED	LBL	14 AWG	GXL
	WIRE_264	BOOM IN	CO75-1	53	XT005	HV76-BM-IN	1	DT008	BRN	BLK	18 AWG	GXL
	WIRE_196	BOOM LT-1-0	X33	G	DT010	S106	1	SPLICE	BLU	WHT	12 AWG	GXL
B	WIRE_195	BOOM LT-1-1	LB81	1	DT009	S106	2	SPLICE	BLU	WHT	14 AWG	GXL
B	WIRE_194	BOOM LT-1-2	LB82	1	DT009	S106	2	SPLICE	BLU	WHT	14 AWG	GXL
	WIRE_263	BOOM OUT	CO75-1	77	XT005	HV76-BM-OT	1	DT008	BRN	WHT	18 AWG	GXL
	WIRE_193	CAB ALM	CO75-1	94	XT005	X35	15	DT008	BRN	-	20 AWG	GXL
	WIRE_192	CAN1-0-0	MS45-2	3	DT018	S32	1	SPLICE	GRN	-	18 AWG	GXL
	WIRE_191	CAN1-0-0	MS45-2	4	DT018	S30	1	SPLICE	YEL	-	18 AWG	GXL
	WIRE_188	CAN1-0-1	S96	2	SPLICE	S30	1	SPLICE	YEL	-	18 AWG	GXL
	WIRE_190	CAN1-0-1	S97	2	SPLICE	S32	1	SPLICE	GRN	-	18 AWG	GXL
	WIRE_262	CAN1-0-2	CO75-2	15	XT005	S96	1	SPLICE	YEL	-	20 AWG	GXL
	WIRE_261	CAN1-0-2	CO75-2	16	XT005	S97	1	SPLICE	GRN	-	20 AWG	GXL
	WIRE_260	CAN1-0-3	X95	1	DT017	S96	1	SPLICE	YEL	-	18 AWG	GXL
	WIRE_259	CAN1-0-3	X95	2	DT017	S97	1	SPLICE	GRN	-	18 AWG	GXL
	WIRE_189	CAN1-0-4	X35	26	DT018	S30	2	SPLICE	YEL	-	18 AWG	GXL
	WIRE_187	CAN1-0-4	X35	27	DT018	S32	2	SPLICE	GRN	-	18 AWG	GXL
	WIRE_258	CAN2-0-0	CO75-2	53	XT005	S98	1	SPLICE	YEL	-	20 AWG	GXL
	WIRE_257	CAN2-0-0	CO75-2	54	XT005	S99	1	SPLICE	GRN	-	20 AWG	GXL
	WIRE_186	CAN2-0-1	S98	2	SPLICE	X35	28	DT018	YEL	-	18 AWG	GXL
	WIRE_185	CAN2-0-1	S99	2	SPLICE	X35	29	DT018	GRN	-	18 AWG	GXL
	WIRE_256	CAN2-0-2	X94	1	DT017	S98	1	SPLICE	YEL	-	18 AWG	GXL
	WIRE_255	CAN2-0-2	X94	2	DT017	S99	1	SPLICE	GRN	-	18 AWG	GXL
	WIRE_178	FAN C	CO75-2	14	XT005	X35	13	DT008	VIO	BRN	20 AWG	GXL
A	WIRE_254	FLASH A-0-0	CO75-1	90	XT005	S178	2	SPLICE	BLU	LGR	20 AWG	GXL
	WIRE_253	FLASH A-0-1	LB176	2	DT008	S178	2	SPLICE	BLU	LGR	16 AWG	GXL
	WIRE_252	FLASH A-0-2	LB175	2	DT008	S178	1	SPLICE	BLU	LGR	16 AWG	GXL
A	WIRE_251	FLASH B-0-0	CO75-1	89	XT005	S177	2	SPLICE	BLU	TAN	20 AWG	GXL
	WIRE_250	FLASH B-0-1	LB176	1	DT008	S177	2	SPLICE	BLU	TAN	16 AWG	GXL
	WIRE_249	FLASH B-0-2	LB175	1	DT008	S177	1	SPLICE	BLU	TAN	16 AWG	GXL
	WIRE_248	FWD SW	JS88	4	DT008	CO75-2	50	XT005	VIO	RED	20 AWG	GXL
	WIRE_182	GND-1	MS45-1	E	DT010	X89-1	1	RING	BLK	-	12 AWG	GXL
	WIRE_181	GND-1	MS45-1	F	DT010	X89-1	1	RING	BLK	-	12 AWG	GXL
	WIRE_184	GND-1	MS45-1	G	DT010	X89-1	1	RING	BLK	-	12 AWG	GXL
	WIRE_183	GND-1	MS45-1	H	DT010	X89-1	1	RING	BLK	-	12 AWG	GXL
	WIRE_165	GND-7	X33	E	DT010	X89-7	1	RING	BLK	-	12 AWG	GXL
	WIRE_166	GND-7	X33	F	DT010	X89-7	1	RING	BLK	-	12 AWG	GXL
	WIRE_244	GND-7-1	HV76-BM-IN	2	DT008	S153	1	SPLICE	BLK	-	18 AWG	GXL
	WIRE_245	GND-7-1	HV76-BM-OT	2	DT008	S153	1	SPLICE	BLK	-	18 AWG	GXL
	WIRE_243	GND-7-1	HV76-HT-DN	2	DT008	S153	1	SPLICE	BLK	-	18 AWG	GXL
	WIRE_242	GND-7-1	HV76-HT-UP	2	DT008	S153	1	SPLICE	BLK	-	18 AWG	GXL
A	WIRE_246	GND-7-1	HV76-SW-LT	2	DT008	S153	1	SPLICE	BLK	-	20 AWG	GXL
A	WIRE_247	GND-7-1	HV76-SW-RT	2	DT008	S153	1	SPLICE	BLK	-	20 AWG	GXL
	WIRE_177	GND-7-1	X89-7	1	RING	S153	2	SPLICE	BLK	-	12 AWG	GXL
	WIRE_235	GND-7-2	HV154	2	DT008	S155	1	SPLICE	BLK	-	20 AWG	GXL
	WIRE_241	GND-7-2	HV76-AUX-1	2	DT008	S155	1	SPLICE	BLK	-	18 AWG	GXL
	WIRE_240	GND-7-2	HV76-AUX-2	2	DT008	S155	1	SPLICE	BLK	-	18 AWG	GXL
	WIRE_239	GND-7-2	HV76-PLT	2	DT008	S155	1	SPLICE	BLK	-	20 AWG	GXL
	WIRE_238	GND-7-2	HV76-SW-BK	2	DT008	S155	1	SPLICE	BLK	-	20 AWG	GXL

FROM-TO WIRE LIST

REV	WIRE NAME (REF ONLY)	WIRE DESIGNATION	FROM CONNECTOR	FROM PIN	FROM TERM INDEX #	TO CONNECTOR	TO PIN	TO TERM INDEX #	WIRE COLOR	STRIPE COLOR	GAUGE	TYPE
	WIRE_237	GND-7-2	HV85-AC	2	DT008	S155	2	SPLICE	BLK	-	18 AWG	GXL
	WIRE_236	GND-7-2	HV85-HTR	2	DT008	S155	2	SPLICE	BLK	-	20 AWG	GXL
	WIRE_173	GND-7-2	X89-7	1	RING	S155	2	SPLICE	BLK	-	12 AWG	GXL
	WIRE_176	GND-7-3	CO75-1	22	XT005	S156	1	SPLICE	BLK	-	20 AWG	GXL
	WIRE_179	GND-7-3	CO75-1	23	XT005	S156	1	SPLICE	BLK	-	20 AWG	GXL
	WIRE_174	GND-7-3	CO75-1	24	XT006	S156	1	SPLICE	BLK	-	16 AWG	GXL
	WIRE_172	GND-7-3	CO75-2	2	XT007	S156	1	SPLICE	BLK	-	16 AWG	GXL
	WIRE_175	GND-7-3	CO75-2	7	XT006	S156	1	SPLICE	BLK	-	16 AWG	GXL
	WIRE_171	GND-7-3	CO75-2	20	XT006	S156	1	SPLICE	BLK	-	16 AWG	GXL
	WIRE_170	GND-7-3	CO75-2	33	XT006	S156	1	SPLICE	BLK	-	16 AWG	GXL
	WIRE_164	GND-7-3	CO75-2	46	XT006	S156	1	SPLICE	BLK	-	16 AWG	GXL
	WIRE_180	GND-7-3	S156	2	SPLICE	X89-7	1	RING	BLK	-	10 AWG	GXL
	WIRE_159	GND-8	MS78	A	BUL	X89-8	1	RING	BLK	-	16 AWG	GXL
	WIRE_162	GND-8	SN79	B	PT010	X89-8	1	RING	BLK	-	18 AWG	GXL
	WIRE_156	GND-8	WH86-FAN	2	DT009	X89-8	1	RING	BLK	-	14 AWG	GXL
	WIRE_157	GND-8	X172-5	1	SHRINK	X89-8	1	RING	BLK	-	14 AWG	GXL
	WIRE_158	GND-8	X172-6	1	SHRINK	X89-8	1	RING	BLK	-	14 AWG	GXL
	WIRE_160	GND-8	X172-7	1	SHRINK	X89-8	1	RING	BLK	-	14 AWG	GXL
	WIRE_161	GND-8	X89-8	1	RING	MS77	A	BUL	BLK	-	16 AWG	GXL
B	WIRE_150	GND-9	LB137	2	DT009	X89-9	1	RING	BLK	-	14 AWG	GXL
	WIRE_149	GND-9	LB175	4	DT008	X89-9	1	RING	BLK	-	16 AWG	GXL
	WIRE_148	GND-9	LB176	4	DT008	X89-9	1	RING	BLK	-	16 AWG	GXL
B	WIRE_151	GND-9	LB80	2	DT009	X89-9	1	RING	BLK	-	14 AWG	GXL
B	WIRE_153	GND-9	LB82	2	DT009	X89-9	1	RING	BLK	-	14 AWG	GXL
	WIRE_155	GND-9	MS86	A	BUL	X89-9	1	RING	BLK	-	16 AWG	GXL
B	WIRE_154	GND-9	MS87	A	BUL	X89-9	1	RING	BLK	-	16 AWG	GXL
B	WIRE_163	GND-9	WH87	2	AT010	MS87	A	BUL	BLK	-	16 AWG	GXL
B	WIRE_152	GND-9	X89-9	1	RING	LB81	2	DT009	BLK	-	14 AWG	GXL
A	WIRE_234	HEATER	CO75-2	43	XT005	HV85-HTR	1	DT008	BRN	TAN	20 AWG	GXL
	WIRE_233	HOIST DN	CO75-1	75	XT005	HV76-HT-DN	1	DT008	BRN	GRN	18 AWG	GXL
	WIRE_231	HOIST UP	CO75-1	51	XT005	HV76-HT-UP	1	DT008	BRN	ORG	18 AWG	GXL
	WIRE_232	HOIST UP PROX	CO75-1	47	XT005	SN79	C	PT009	VIO	LGR	20 AWG	GXL
	WIRE_147	HORN-1-0	X35	10	DT008	S103	2	SPLICE	BLU	YEL	16 AWG	GXL
	WIRE_145	HORN-1-1	AH77	1	AT002	MS77	K	BUL	BLU	YEL	16 AWG	GXL
	WIRE_146	HORN-1-1	MS77	K	BUL	S103	2	SPLICE	BLU	YEL	16 AWG	GXL
	WIRE_143	HORN-1-2	AH78	1	AT002	MS78	K	BUL	BLU	YEL	16 AWG	GXL
	WIRE_144	HORN-1-2	MS78	K	BUL	S103	1	SPLICE	BLU	YEL	16 AWG	GXL
	WIRE_230	HTR AC FLOW	CO75-1	79	XT005	HV85-FLW	2	DT008	TAN	ORG	20 AWG	GXL
A	WIRE_142	IGN-1	MS45-2	2	DT008	X35	2	DT008	YEL	BLK	16 AWG	GXL
A	WIRE_141	IGN-306-0	S116	2	SPLICE	X35	6	DT008	YEL	BLU	18 AWG	GXL
A	WIRE_229	IGN-306-1	CO75-2	40	XT005	S116	1	SPLICE	YEL	BLU	20 AWG	GXL
A	WIRE_228	IGN-306-2	JS88	1	DT008	S116	2	SPLICE	YEL	BLU	18 AWG	GXL
A	WIRE_227	IGN-306-3	SN79	A	PT010	S116	1	SPLICE	YEL	BLU	18 AWG	GXL
A	WIRE_140	IGN-307-0	X35	7	DT009	S123	2	SPLICE	YEL	BRN	14 AWG	GXL
A	WIRE_226	IGN-307-1	HV76-TOL-OP	1	DT008	S123	2	SPLICE	YEL	BRN	20 AWG	GXL
A	WIRE_225	IGN-307-2	HV76-TOL-CL	1	DT008	S123	2	SPLICE	YEL	BRN	20 AWG	GXL
A	WIRE_223	IGN-307-3	HV76-TLT-CW	1	DT008	S123	1	SPLICE	YEL	BRN	20 AWG	GXL
A	WIRE_224	IGN-307-4	HV76-TLT-CCW	1	DT008	S123	1	SPLICE	YEL	BRN	20 AWG	GXL
A	WIRE_222	IGN-307-5	HV85-FLW	1	DT008	S123	2	SPLICE	YEL	BRN	20 AWG	GXL
	WIRE_221	PILOT	CO75-1	7	XT005	HV76-PLT	1	DT008	BRN	VIO	20 AWG	GXL
	WIRE_139	PILOT SW	CO75-2	9	XT005	X35	14	DT008	VIO	WHT	20 AWG	GXL
	WIRE_220	REV SW	CO75-2	36	XT005	JS88	5	DT008	VIO	YEL	20 AWG	GXL
	WIRE_132	SP-1	X35	18	DT009	X172-1	1	SHRINK	GRY	BLK	14 AWG	GXL
	WIRE_133	SP-2	X35	19	DT009	X172-2	1	SHRINK	GRY	WHT	14 AWG	GXL
	WIRE_134	SP-3	X35	20	DT009	X172-3	1	SHRINK	GRY	RED	14 AWG	GXL
A	WIRE_135	SP-4	X35	22	DT009	X172-4	1	SHRINK	GRY	YEL	14 AWG	GXL
	WIRE_219	STEER ENABLE	CO75-1	93	XT005	HV154	1	DT008	BRN	PNK	20 AWG	GXL
	WIRE_218	SWING BRK	CO75-1	6	XT005	HV76-SW-BK	1	DT008	BRN	LBL	20 AWG	GXL
A	WIRE_217	SWING LT	CO75-1	78	XT005	HV76-SW-LT	1	DT008	BRN	YEL	20 AWG	GXL
A	WIRE_216	SWING RT	CO75-1	54	XT005	HV76-SW-RT	1	DT008	BRN	RED	20 AWG	GXL
A	WIRE_215	TILT CCW	CO75-1	85	XT005	HV76-TLT-CCW	2	DT008	TAN	YEL	20 AWG	GXL
A	WIRE_214	TILT CW	CO75-1	86	XT005	HV76-TLT-CW	2	DT008	TAN	RED	20 AWG	GXL
A	WIRE_130	TILT SPEED	X35	21	DT008	CO75-2	31	XT005	WHT	GRN	20 AWG	GXL
A	WIRE_213	TOOL CL	CO75-1	84	XT005	HV76-TOL-CL	2	DT008	TAN	WHT	20 AWG	GXL
A	WIRE_212	TOOL OP	CO75-1	80	XT005	HV76-TOL-OP	2	DT008	TAN	BLK	20 AWG	GXL
	WIRE_211	TP-HTR TEMP	SN84	1	PT046	CO75-1	21	XT005	WHT	ORG	20 AWG	GXL
	WIRE_210	TP-HTR TEMP	SN84	2	PT046	CO75-1	45	XT005	BLK	ORG	20 AWG	GXL
	WIRE_208	TP-THR	CO75-1	64	XT005	JS88	3	DT008	WHT	YEL	20 AWG	GXL
	WIRE_209	TP-THR	JS88	2	DT008	CO75-1	46	XT005	BLK	YEL	20 AWG	GXL
	WIRE_131	UP BAT	MS45-2	1	DT008	X35	1	DT008	RED	BLK	16 AWG	GXL
	WIRE_136	UP START SW	CO75-1	48	XT005	X35	9	DT008	VIO	BLK	18 AWG	GXL
B	WIRE_138	WASH-305	WH87	1	AT010	MS87	K	BUL	PNK	YEL	16 AWG	GXL
B	WIRE_137	WASH-305	X35	12	DT008	MS87	K	BUL	PNK	YEL	16 AWG	GXL
	WIRE_169	WORK LT-304-0	X35	11	DT009	S157	1	SPLICE	BLU	VIO	14 AWG	GXL
B	WIRE_168	WORK LT-304-1	LB80	1	DT009	S157	2	SPLICE	BLU	VIO	14 AWG	GXL
B	WIRE_167	WORK LT-304-2	LB137	1	DT009	S157	2	SPLICE	BLU	VIO	14 AWG	GXL

REV	ZONE	DATE	BY	ER NO.	DESCRIPTION	CHKD
C	ALL	02Sep15	EFF	EC150307	REV. LEVEL UPDATE.	RAB
B	ALL	31Jul15	AF	EC150284	UPDATED REVISED ITEMS ON TABLES	RAB

REVISIONS

SPECIFICATIONS

1) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2) ALL WELDING TO STRUCTURAL WELD CODE-STEEL ANSI/AWS D1.1
3) ALL DIMENSIONAL TOLERANCES ARE ± .060
4) MACHINE TOLERANCE TO BE ± .015
5) ALL ANGLES ± 1°
6) MACH. SURF. 125 MAX

NEXT ASSY 82179001

DRAWN BY:	EFF
DATE:	12-Sep-14
CHK'D BY:	AF
DATE:	12-Sep-14
ER NO.:	SO3259735-57
CAGE CODE:	
SIMILAR TO:	
FINISH COAT REQ:	N

GRADALL

TITLE: HARNESS, UPPER

MATL: SEE PARTS LIST

SIZE D | DWG NO. 82173009 | REV C

SCALE: 1/8 | EST WT: 6.4# | SHEET: 8 OF 8

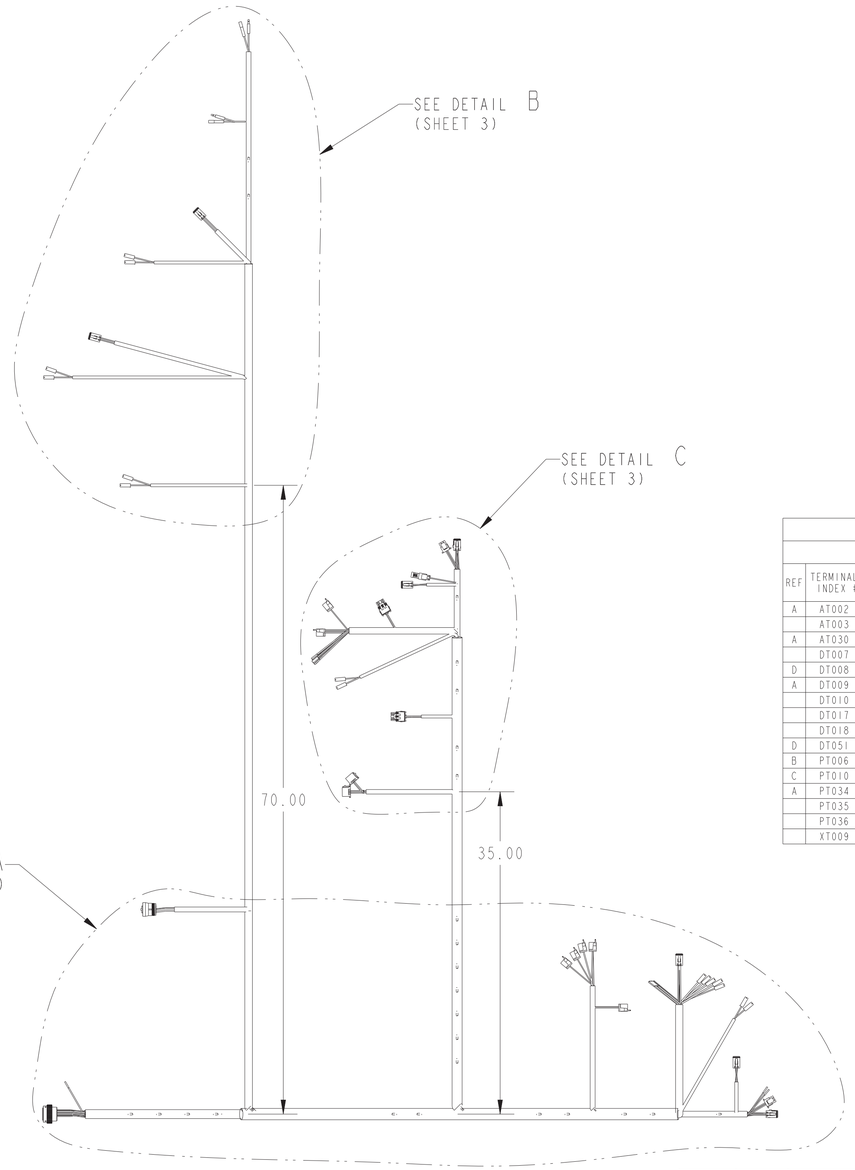
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DRAWING NUMBER
82173008

TWISTED WIRES:
ALL WIRES WITH DESIGNATIONS BEGINNING WITH CAN, TP, OR TT ARE TWISTED WIRES.
ALL TWISTED WIRES SHALL HAVE A MINIMUM TWIST OF 1.5 TWISTS PER INCH.

CAN: SHALL BE A YELLOW AND GREEN TWISTED PAIR.
TP: SHALL BE A TWISTED PAIR, WIRE COLOR AS INDICATED.
TT: SHALL BE TWISTED TRIAD, WIRE COLOR AS INDICATED.
USB CABLE: SHALL BE CABLE SUPPLIED WITH USB CONNECTOR/CABLE ASSEMBLY.



CONNECTOR PARTS LIST

REV	ITEM	QTY	GRADALL PART NUMBER (REF)	VENDOR	DESCRIPTION
	1	2	-	AMP# 1-480706-0	CONNECTOR, UNV. MATE-N-LOK, 9 POS. PLUG, MATRIX
A	2	15	-	AMP# 172076-1	CONNECTOR, MARK II 0.250, IF POSI-LOCK HOUSING
	3	7	-	CARLING# VCH-01	CONNECTOR, SWITCH, 8 POS.
	4	2	91504046	DEUTSCH# DT06-12SA	CONNECTOR, DT, PLUG 12S A KEY
	5	2	VA2139-0047	DEUTSCH# DT06-4S	CONNECTOR, DT, PLUG 4S
B	6	3	VA2139-0048	DEUTSCH# DT06-6S	CONNECTOR, DT, PLUG 6S
	7	1	88991185	DEUTSCH# DTM04-2P-EP10	CONNECTOR, DTM, RECPT. 2P, RESISTOR, J1939
	8	1	88991158	DEUTSCH# DTM06-2S	CONNECTOR, DTM, PLUG 2S
	9	1	-	DEUTSCH# HD16-6-12S-B010	CONNECTOR, HD10, PLUG 6S THREADED
	10	1	-	DEUTSCH# HD36-24-29SE	CONNECTOR, HD30, PLUG 24-29S E SEAL
	11	2	VA2139-0066	DEUTSCH# W12S	CONNECTOR, WEDGE, ORANGE, 12S
	12	2	VA2139-0063	DEUTSCH# W4S	CONNECTOR, WEDGE, ORANGE, 4S
B	13	3	VA2139-0064	DEUTSCH# W6S	CONNECTOR, WEDGE, ORANGE, 6S
	14	1	88991183	DEUTSCH# WM-2SB	CONNECTOR, WEDGE, BLACK, 2S
	15	1	-	HAMA# 00062256 *	CONNECTOR, ISO10487 PLUG POWER, 8F, BLACK
	16	1	-	HAMA# 00062269 *	CONNECTOR, ISO10487 PLUG SPEAKER, 8F, BROWN
B	17	2	80963059	PACKARD# 12015793	CONNECTOR, WEATHER-PACK, 3F
	18	2	-	MOLEX# 0191640040 * NSPA# KS7-14-15M *	TERMINAL, BULLET, MALE, .157, 16-14 AWG, SEALED
	19	2	-	MOLEX# 0191640054 * NSPA# KS7-14-15F *	TERMINAL, BULLET, FEMALE, .157, 16-14 AWG, SEALED

* INDICATES EQUIVALENT PART MAY BE USED.

TERMINAL TABLE

REF	TERMINAL INDEX #	QTY	VENDOR	TERMINAL GRADALL PART NUMBER (REF)	TERMINAL VENDOR PART NUMBER	SEAL GRADALL PART NUMBER (REF)	SEAL VENDOR PART NUMBER	DESCRIPTION
A	AT002	11	AMP	-	63097-1	-	-	TERMINAL, POSI LOK MARK II, RECPT .250 x .032, TIN, 14-18 AWG
	AT003	4	AMP	-	63239-1	-	-	TERMINAL, POSI LOK MARK II, RECPT .250 x .032, TIN, 10-12 AWG
A	AT030	16	AMP	-	350689-1	-	-	TERMINAL, UNV. MATE-N-LOK, SOCKET , TIN, 18-24 AWG
	DT007	4	DEUTSCH	77363348	0462-201-20141	-	-	TERMINAL, SOLID, SOCKET 20, NICKEL, 20 AWG
D	DT008	30	DEUTSCH	77363229	0462-201-16141	-	-	TERMINAL, SOLID, SOCKET 16, NICKEL, 16-20 AWG
A	DT009	23	DEUTSCH	80463058	0462-209-16141	-	-	TERMINAL, SOLID, SOCKET 16, NICKEL, 14 AWG
	DT010	9	DEUTSCH	77363347	0462-203-12141	-	-	TERMINAL, SOLID, SOCKET 12, NICKEL, 12-14 AWG
	DT017	4	DEUTSCH	77373060	0462-201-20331	-	-	TERMINAL, SOLID, SOCKET 20, GOLD, 20 AWG
	DT018	4	DEUTSCH	88991141	0462-201-16331	-	-	TERMINAL, SOLID, SOCKET 16, GOLD, 16-20 AWG
D	DT051	13	DEUTSCH	77363230	114017	-	-	TERMINAL, PLUG 12-16
B	PT006	3	PACKARD	80963068	12124580	80963065	12015284	TERMINAL, WEATHER-PACK, SLEEVE, TIN, 14-16 AWG, GREEN SEAL
C	PT010	3	PACKARD	-	12089188	-	12041352	TERMINAL, WEATHER-PACK, SLEEVE, TIN, 18-20 AWG, PURPLE SEAL
A	PT034	9	PACKARD	-	12015869	-	-	TERMINAL, METRI-PACK 630 UNSEALED, FEMALE, TIN, 18-20 AWG
	PT035	8	PACKARD	-	12015870	-	-	TERMINAL, METRI-PACK 630 UNSEALED, FEMALE, TIN, 14-16 AWG
	PT036	1	PACKARD	-	12084590	-	-	TERMINAL, METRI-PACK 630 UNSEALED, FEMALE, TIN, 10-12 AWG
	XT009	7	HAMA	-	00062257	-	-	TERMINAL, ISO JUNIOR TIMER, FEMALE, TIN

NOTES: (UNLESS OTHERWISE SPECIFIED)

1. HARNESS SHALL BE MANUFACTURED TO GRADALL ELECTRICAL SPECIFICATION 77319050 UNLESS OTHERWISE SPECIFIED.
2. ALL WIRES SHALL CONFORM TO SAE J1128, TYPE AS INDICATED.
   12 GAUGE WIRE TO BE TYPE GXL, 19/25 STRANDING.
   14 GAUGE WIRE TO BE TYPE GXL, 19/27 STRANDING.
   16 GAUGE WIRE TO BE TYPE GXL, 19/29 STRANDING.
   18 GAUGE WIRE TO BE TYPE GXL, 16/30 STRANDING.
   20 GAUGE WIRE TO BE TYPE GXL, 7/28 STRANDING.
3. WRAP HARNESS WITH WOVEN NYLON LOOM.
4. TAPE SLITTED CORRUGATED CONDUIT AT ALL ENDS AND EVERY 4" ALONG LENGTH.
5. ALL UNINSULATED TERMINALS SHALL BE COVERED BY INSULATING MATERIAL OR HOUSING.
6. ALL SPLICES SHALL BE ULTRASONICALLY WELDED OR SOLDERED.
7. ALL SPLICED CONNECTIONS SHALL BE WATERTIGHT, INSULATED, AND NO LESS THAN 1" FROM OTHER SPLICES OR BRANCHES.
8. WIRE DESIGNATIONS TO BE VISIBLY HOT-STAMPED ON WIRE ENDS.
9. DESIGNATION LABELS ARE SHOWN IN BOXED NOTES (ARROW SHOWING PLACEMENT OF LABEL). THEY SHOULD BE THE WRAP-AROUND KIND (NOT FLAG STYLE), WITH A PERMANENT WEATHER AND OIL RESISTANT MATERIAL. THIS IS FOR ASSEMBLY AND TROUBLESHOOTING PURPOSES.
10. TERMINAL PART NUMBERS FOR REFERENCE. ALTERNATE PART NUMBERS MAY BE USED BASED ON HARNESS MANUFACTURING PROCESSES.
11. LENGTH TOLERANCES FOR TOTAL BRANCH RUNS:
    UP TO 6.00 _ _ _ _ ±0.50
    6.00 TO 36.00 _ _ _ +1.00/-0.50
    36.00 AND UP _ _ _ +2.00/-0.50
12. WIRES NOT IN LOOM SHALL BE ZIP TIED TOGETHER INTO BUNDLES AS SHOWN AND WITH FOLLOWING INSTRUCTIONS:
    -ALL BRANCHES SHALL HAVE A ZIP TIE AT BASE OF BRANCH.
    -NO ZIP TIES WITHIN 3" TO 4" OF A CONNECTOR (UNLESS OTHERWISE SPECIFIED).
    -ZIP TIES SHALL BE PLACED AT A MAXIMUM OF EVER 3" ALONG THEIR LENGTHS.
    -THERE SHALL BE NO BUNDLE OF WIRES LONGER THAT 3" (UNLESS UNDER LOOM OR A SINGLE WIRE) WITHOUT ZIP TIES.
13. HARNESS SHALL BE IDENTIFIED WITH GRADALL PART NUMBER, REVISION, VENDOR PART NUMBER, AND BUILD CODE.
14. ALL CIRCUITS MUST BE ELECTRICALLY TESTED FOR CONTINUITY AND CORRECT POSITION. ALL DIODES TO BE TESTED FOR CORRECT BIASING.

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REV	ZONE	DATE	BY	ER NO.	DESCRIPTION	CHKD
D	B3	16Sep16	AF	EC160290	DT008 QTY WAS 29, DT051 QTY WAS 14.	RDM
C	C3	8Jan16	AF	EC160013	PT010 SLEEVE WAS PT020 PIN.	RAB
B	ALL	16Jul15	AF	EC150273	CHANGED LB9-P TO LB9 AND CHANGED CONNECTOR. CHANGED WIRING IN SW6.	RAB
A	ALL	24Mar15	EFF	EC150122	CHANGED NOTE 9. IT 2 QTY WAS (11).CHANGED MS10 & MS11 CONNECTORS. CHANGED WIRE IN SN5pA & LB8-S. IGN-306 WAS IGN-2. REMOVED SP-5 WIRE FROM X28 ADDED X28-1. MOVED TILT SPEED WHT/GRN WIRE FROM JS1-1p5 TO X28p15.	AF

REVISIONS

SPECIFICATIONS
1) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2) ALL WELDING TO STRUCTURAL WELD CODE-STEEL ANSI/AWS D1.1
3) ALL DIMENSIONAL TOLERANCES ARE ± .060
4) MACHINE TOLERANCE TO BE ± .015
5) ALL ANGLES ± 1°
6) MACH. SURF. 125 MAX

NEXT ASSY 82165001

DRAWN BY:	EFF
DATE:	19-Sep-14
CHK'D BY:	AF
DATE:	19-Sep-14
ER NO.:	SO3259735-57
CAGE CODE:	
SIMILAR TO:	
FINISH COAT REQ:	N

GRADALL

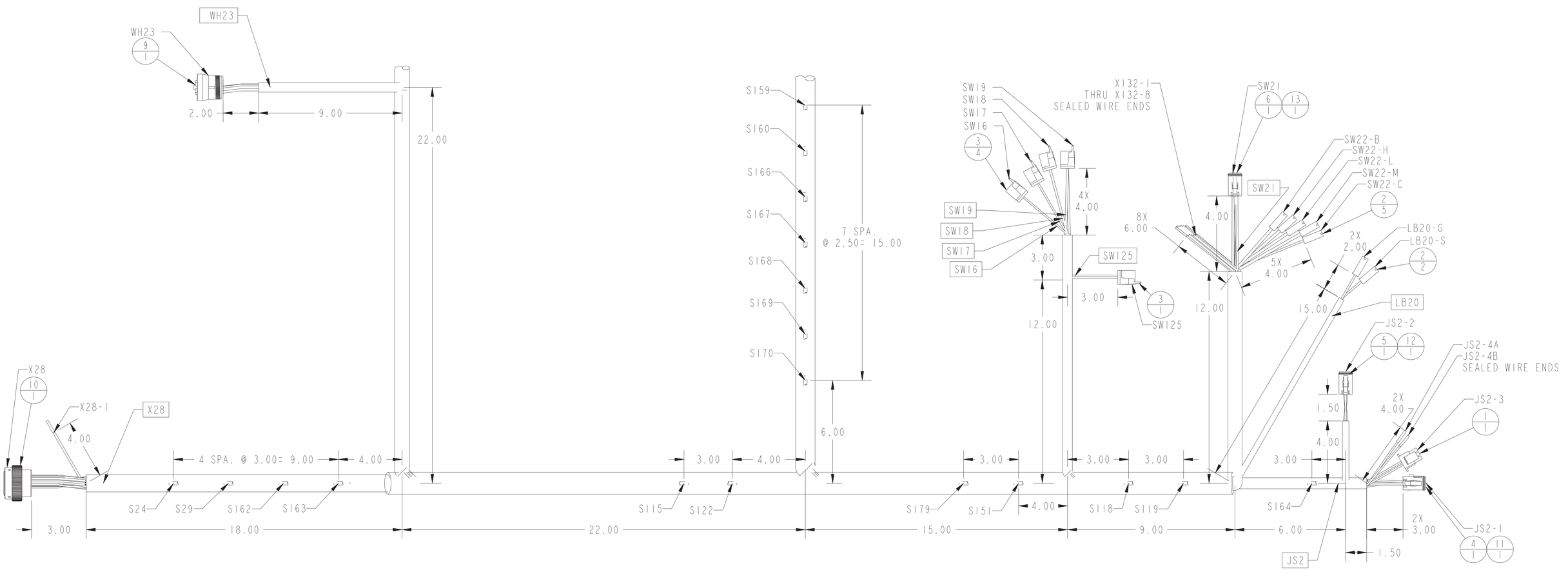
TITLE: HARNESS, UPPER CAB

MATL: SEE PARTS LIST

SIZE D | DWG NO. 82173008 | REV D

SCALE: 3/32 | EST WT: 14.6# | SHEET: 1 OF 5

DRAWING NUMBER 82173008



DETAIL A
SCALE 3/8

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REV	ZONE	DATE	BY	ER NO.	DESCRIPTION	CHKD
D	B1	16Sep16	AF	EC160290	ADDED JS2-4A AND JS2-4B.	RDM
C	A1	8Jan16	AF	EC160013	REV UPDATE ONLY.	RAB
B	A1	16Jul15	AF	EC150273	REV UPDATE ONLY.	RAB
A	B8	24Mar15	EFF	EC150122	ADDED X28-1. MOVED LB20 CONNECTORS	AF

REVISIONS

SPECIFICATIONS

1) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2) ALL WELDING TO STRUCTURAL WELD CODE-STEEL ANSI/AWS D1.1
3) ALL DIMENSIONAL TOLERANCES ARE ± .060
4) MACHINE TOLERANCE TO BE ± .015
5) ALL ANGLES ± 1°
6) MACH. SURF. 125 MAX

NEXT ASSY 82165001

DRAWN BY:	EFF
DATE:	19-Sep-14
CHK'D BY:	AF
DATE:	19-Sep-14
ER NO.:	S03259735-57
CAGE CODE:	
SIMILAR TO:	
FINISH COAT REQ:	N

GRADALL

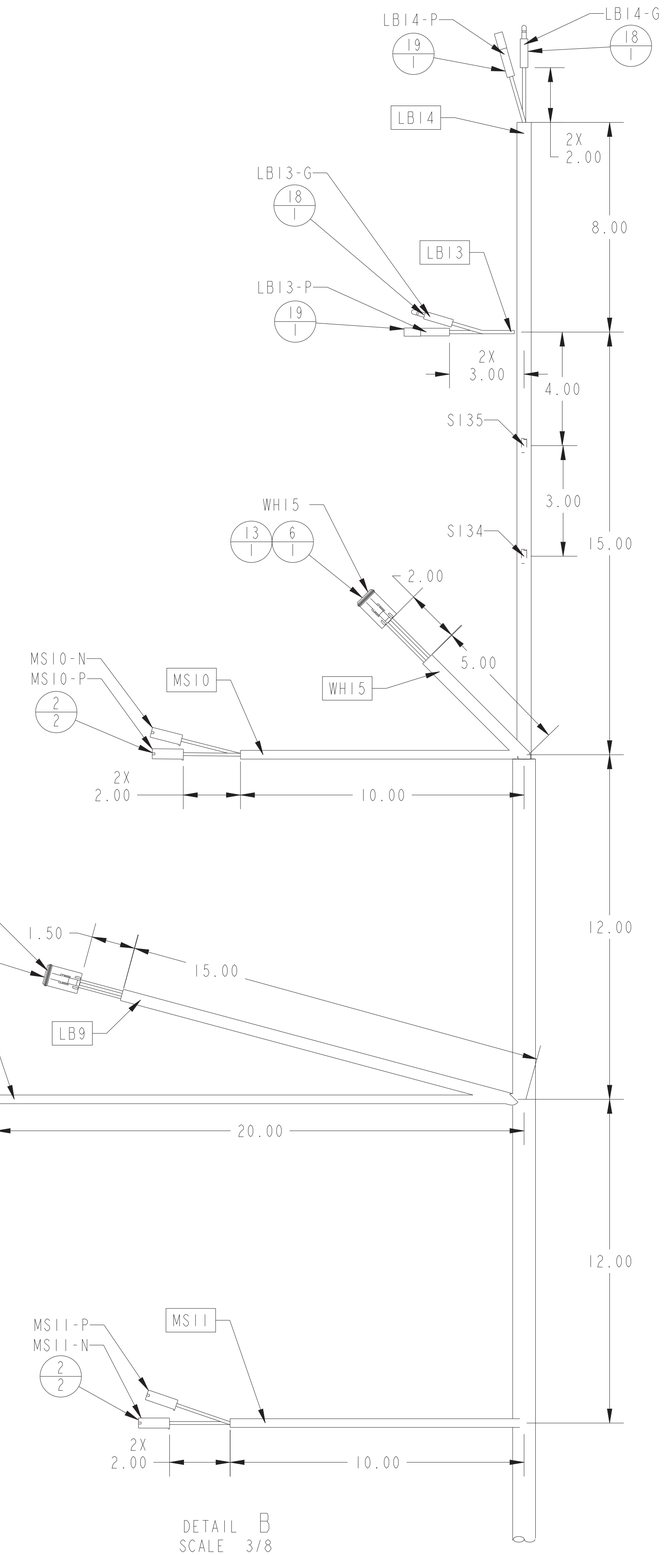
TITLE: HARNESS, UPPER CAB

MATL: SEE PARTS LIST

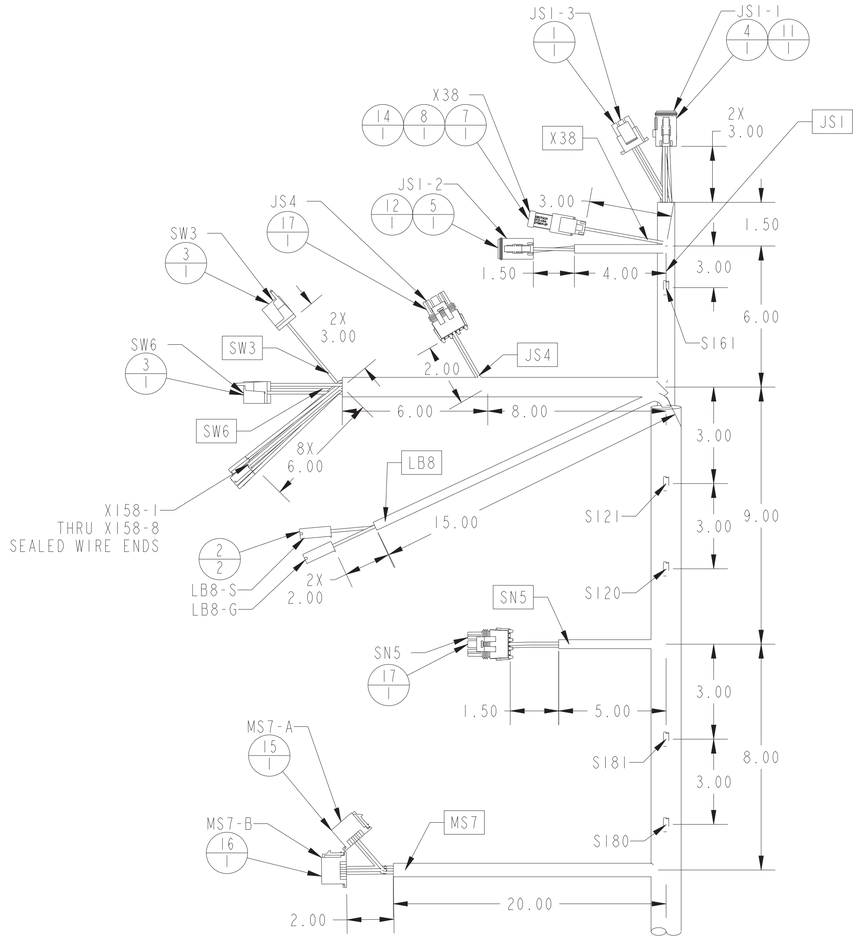
SIZE D | DWG NO. 82173008 | REV D

SCALE: 3/32 | EST WT: 14.6# | SHEET: 2 OF 5

DRAWING NUMBER 82173008



DETAIL B
SCALE 3/8



DETAIL C
SCALE 3/8

UNLESS OTHERWISE NOTED:
1) THIS IS A PRO ENGINEER / WINDCHILL CONTROLLED DOCUMENT.
2) ALL DIMENSIONS ARE IN INCHES.

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REV	ZONE	DATE	BY	ER NO.	DESCRIPTION	CHKD
D	A1	16Sep16	AF	EC160290	REV UPDATE ONLY.	RDM
C	A1	8Jan16	AF	EC160013	REV UPDATE ONLY.	RAB
B	B8,C4	16Jul15	AF	EC150273	CHANGED LB9-P TO LB9 AND CHANGED CONNECTOR.	RAB
A	ALL	24Mar15	EFF	EC150122	CHANGE CONNECTORS FOR MS10-N, MS10-P, MS11-N, & MS11-P (MS7) 20.00 WAS 9.00. MOVED LB8 CONNECTORS	AF

REVISIONS

SPECIFICATIONS

1) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2) ALL WELDING TO STRUCTURAL WELD CODE-STEEL ANSI/AWS D1.1
3) ALL DIMENSIONAL TOLERANCES ARE ± .060
4) MACHINE TOLERANCE TO BE ± .015
5) ALL ANGLES ± 1°
6) MACH. SURF. 125 MAX

NEXT ASSY 82165001

DRAWN BY:	EFF
DATE:	19-Sep-14
CHK'D BY:	AF
DATE:	19-Sep-14
ER NO.:	SO3259735-57
CAGE CODE:	
SIMILAR TO:	
FINISH COAT REQ:	N

GRADALL

TITLE: HARNESS, UPPER CAB

MATL: SEE PARTS LIST

SIZE D | DWG NO. 82173008 | REV D

SCALE: 3/32 | EST WT: 14.6# | SHEET: 3 OF 5

DRAWING NUMBER 82173008 REV. D

DRAWING NUMBER 82173008

CONNECTOR PIN OUT

REV	CONNECTOR DESIGNATION	CONN POS	TERMINAL INDEX #	WIRE DESIGNATION	WIRE COLOR	STRIPE COLOR	GAUGE	TYPE	TO
A	JS1-1	1	DT008	IGN-306-2	YEL	BLU	18 AWG	GXL	S115 (2)
	JS1-1	2	DT008	GND-11	BLK	-	18 AWG	GXL	S122 (2)
	JS1-1	3	DT051	PLUG					
	JS1-1	4	DT008	5V PWR	WHT	BLK	18 AWG	GXL	JS4 (A)
A	JS1-1	5	DT051	PLUG					
	JS1-1	6	DT051	PLUG					
	JS1-1	7	DT008	GND-JSL	BLK	GRN	18 AWG	GXL	S161 (1)
	JS1-1	8	DT008	PARK BRAKE	GRN	TAN	18 AWG	GXL	SW3 (3)
	JS1-1	9	DT051	PLUG					
	JS1-1	10	DT051	PLUG					
	JS1-1	11	DT018	CAN2-0-3	YEL	-	18 AWG	GXL	S120 (1)
	JS1-1	12	DT018	CAN2-0-3	GRN	-	18 AWG	GXL	S121 (1)
	JS1-2	1	DT051	PLUG					
	JS1-2	2	DT008	JSL SW LEFT	GRN	BLU	18 AWG	GXL	JS1-3 (1)
	JS1-2	3	DT008	JSL SW RIGHT	GRN	VIO	18 AWG	GXL	JS1-3 (3)
	JS1-2	4	DT008	JSL SW B	GRN	YEL	18 AWG	GXL	JS1-3 (8)
	JS1-3	1	AT030	JSL SW LEFT	GRN	BLU	18 AWG	GXL	JS1-2 (2)
	JS1-3	2	AT030	GND-JSL	BLK	GRN	18 AWG	GXL	S161 (1)
	JS1-3	3	AT030	JSL SW RIGHT	GRN	VIO	18 AWG	GXL	JS1-2 (3)
	JS1-3	4	AT030	GND-JSL	BLK	GRN	18 AWG	GXL	S161 (1)
	JS1-3	5	AT030	BAT-207-2	RED	LGR	18 AWG	GXL	S162 (1)
	JS1-3	6	AT030	HORN-0-2	BLU	RED	18 AWG	GXL	S163 (1)
	JS1-3	7	AT030	GND-JSL	BLK	GRN	18 AWG	GXL	S161 (1)
	JS1-3	8	AT030	JSL SW B	GRN	YEL	18 AWG	GXL	JS1-2 (4)
	JS1-3	9	EMPTY	EMPTY					
A	JS2-1	1	DT008	IGN-306-1	YEL	BLU	18 AWG	GXL	S115 (2)
	JS2-1	2	DT008	GND-11	BLK	-	18 AWG	GXL	S122 (2)
	JS2-1	3	DT051	PLUG					
	JS2-1	4	DT051	PLUG					
	JS2-1	5	DT051	PLUG					
	JS2-1	6	DT051	PLUG					
	JS2-1	7	DT008	GND-JSR	BLK	VIO	18 AWG	GXL	S164 (1)
	JS2-1	8	DT008	AUX 1 SW	GRN	GRY	18 AWG	GXL	SW125 (1)
	JS2-1	9	DT008	AUX 2 SW	GRN	RED	18 AWG	GXL	SW125 (3)
	JS2-1	10	DT051	PLUG					
	JS2-1	11	DT018	CAN2-0-1	YEL	-	18 AWG	GXL	S118 (1)
	JS2-1	12	DT018	CAN2-0-1	GRN	-	18 AWG	GXL	S119 (1)
D	JS2-2	1	DT008	JSR SW A	GRN	PNK	18 AWG	GXL	JS2-3 (6)
	JS2-2	2	DT008	JSR SW LEFT	GRN	LGR	18 AWG	GXL	JS2-3 (1)
	JS2-2	3	DT008	JSR SW RIGHT	GRN	LBL	18 AWG	GXL	JS2-3 (3)
	JS2-2	4	DT008	JSR SW B	GRN	BRN	18 AWG	GXL	JS2-3 (8)
	JS2-3	1	AT030	JSR SW LEFT	GRN	LGR	18 AWG	GXL	JS2-2 (2)
	JS2-3	2	AT030	GND-JSR	BLK	VIO	18 AWG	GXL	S164 (1)
	JS2-3	3	AT030	JSR SW RIGHT	GRN	LBL	18 AWG	GXL	JS2-2 (3)
	JS2-3	4	AT030	GND-JSR	BLK	VIO	18 AWG	GXL	S164 (1)
D	JS2-3	5	AT030	GND-JSR	BLK	VIO	18 AWG	GXL	S164 (1)
D	JS2-3	6	AT030	JSR SW A	GRN	PNK	18 AWG	GXL	JS2-2 (1)
	JS2-3	7	AT030	GND-JSR	BLK	VIO	18 AWG	GXL	S164 (1)
	JS2-3	8	AT030	JSR SW B	GRN	BRN	18 AWG	GXL	JS2-2 (4)
	JS2-3	9	EMPTY	EMPTY					
D	JS2-4A	1	SHRINK	BAT-207-1	RED	LGR	18 AWG	GXL	S162 (1)
D	JS2-4B	1	SHRINK	HORN-0-1	BLU	RED	18 AWG	GXL	S163 (1)
	SW3	1	EMPTY	EMPTY					
	SW3	2	PT034	GND-JSL	BLK	GRN	18 AWG	GXL	S161 (2)
	SW3	3	PT034	PARK BRAKE	GRN	TAN	18 AWG	GXL	JS1-1 (8)
	SW3	4	EMPTY	EMPTY					
	SW3	5	EMPTY	EMPTY					
	SW3	6	EMPTY	EMPTY					
	SW3	7	EMPTY	EMPTY					
	SW3	8	EMPTY	EMPTY					
C	JS4	A	PT010	5V PWR	WHT	BLK	18 AWG	GXL	JS1-1 (4)
C	JS4	B	PT010	TILT SPEED	WHT	GRN	18 AWG	GXL	X28 (15)
C	JS4	C	PT010	GND-JSL	BLK	GRN	18 AWG	GXL	S161 (2)
A	SN5	A	PT006	IGN-306-3	YEL	BLU	18 AWG	GXL	S115 (2)
B	SN5	B	PT006	GND-10-3	BLK	-	16 AWG	GXL	S180 (1)
	SN5	C	PT006	PILOT SW	VIO	WHT	16 AWG	GXL	X28 (14)
B	SW6	1	PT035	STROBE-1-1	BLU	TAN	16 AWG	GXL	SW6 (3)
B	SW6	2	PT035	ACC-217-5	ORG	VIO	16 AWG	GXL	S169 (2)
B	SW6	3	PT036	STROBE-1-0	BLU	TAN	16 AWG	GXL	LB9 (1)
B	SW6	3	PT036	STROBE-1-1	BLU	TAN	16 AWG	GXL	SW6 (1)
B	SW6	4	PT035	STROBE-2	BLU	LBL	16 AWG	GXL	LB9 (2)
	SW6	5	PT035	ACC-217-4	ORG	VIO	16 AWG	GXL	S169 (2)
B	SW6	6	EMPTY	EMPTY					
	SW6	7	EMPTY	EMPTY					
	SW6	8	EMPTY	EMPTY					
	MS7-A	1	EMPTY	EMPTY					
	MS7-A	2	EMPTY	EMPTY					
	MS7-A	3	EMPTY	EMPTY					
	MS7-A	4	XT009	ACC-212-1	ORG	WHT	16 AWG	GXL	S181 (2)
	MS7-A	5	EMPTY	EMPTY					
	MS7-A	6	EMPTY	EMPTY					
	MS7-A	7	XT009	BAT-202-2	RED	ORG	16 AWG	GXL	S170 (2)
	MS7-A	8	XT009	GND-10-3	BLK	-	16 AWG	GXL	S180 (2)
	MS7-B	1	XT009	TP-RT SPKR	PNK	LGR	16 AWG	GXL	MS10-P (1)
	MS7-B	2	XT009	TP-RT SPKR	BLK	LGR	16 AWG	GXL	MS10-N (1)
	MS7-B	3	EMPTY	EMPTY					
	MS7-B	4	EMPTY	EMPTY					
	MS7-B	5	EMPTY	EMPTY					
	MS7-B	6	EMPTY	EMPTY					
	MS7-B	7	XT009	TP-LT SPKR	PNK	BRN	16 AWG	GXL	MS11-P (1)
	MS7-B	8	XT009	TP-LT SPKR	BLK	BRN	16 AWG	GXL	MS11-N (1)
	LB8-G	1	AT002	GND-10-3	BLK	-	16 AWG	GXL	S180 (1)
A	LB8-S	1	AT002	ACC-212-2	ORG	WHT	16 AWG	GXL	S181 (1)
B	LB9	1	DT008	STROBE-1-0	BLU	TAN	16 AWG	GXL	SW6 (3)
B	LB9	2	DT008	STROBE-2	BLU	LBL	16 AWG	GXL	SW6 (4)
B	LB9	3	DT008	STROBE-3	BLU	LGR	16 AWG	GXL	X158-11 (1)
B	LB9	4	DT008	STROBE-4	BLU	GRY	16 AWG	GXL	X158-10 (1)

CONNECTOR PIN OUT

REV	CONNECTOR DESIGNATION	CONN POS	TERMINAL INDEX #	WIRE DESIGNATION	WIRE COLOR	STRIPE COLOR	GAUGE	TYPE	TO
B	LB9	5	DT008	STROBE-5	BLU	PNK	16 AWG	GXL	X158-9 (1)
B	LB9	6	DT008	GND-10-3	BLK	-	16 AWG	GXL	S180 (2)
A	MS10-N	1	AT002	TP-RT SPKR	BLK	LGR	16 AWG	GXL	MS7-B (2)
A	MS10-P	1	AT002	TP-RT SPKR	PNK	LGR	16 AWG	GXL	MS7-B (1)
A	MS11-N	1	AT002	TP-LT SPKR	BLK	BRN	16 AWG	GXL	MS7-B (8)
A	MS11-P	1	AT002	TP-LT SPKR	PNK	BRN	16 AWG	GXL	MS7-B (7)
	LB12-G	1	AT002	GND-10-2	BLK	-	16 AWG	GXL	S179 (2)
	LB12-S	1	AT002	ACC-211-4	ORG	BLK	16 AWG	GXL	S151 (2)
	LB13-G	1	BUL	GND-10-1	BLK	-	14 AWG	GXL	S135 (1)
	LB13-P	1	BUL	CAB LT-303-1	BLU	BRN	14 AWG	GXL	S134 (1)
	LB14-G	1	BUL	GND-10-1	BLK	-	14 AWG	GXL	S135 (1)
	LB14-P	1	BUL	CAB LT-303-2	BLU	BRN	14 AWG	GXL	S134 (1)
	WH15	1	DT009	WIPER H	PNK	LBL	14 AWG	GXL	SW21 (1)
	WH15	2	DT009	WIPER L	PNK	TAN	14 AWG	GXL	SW21 (2)
	WH15	3	DT009	WIPER P	PNK	GRY	14 AWG	GXL	SW21 (3)
	WH15	4	DT009	GND-10-4	BLK	-	14 AWG	GXL	S24 (1)
	WH15	5	DT051	PLUG					
	WH15	6	DT009	ACC-219-2	ORG	LGR	14 AWG	GXL	S29 (1)
	SW16	1	EMPTY	EMPTY					
	SW16	2	PT034	ACC-211-2	YEL	BLK	18 AWG	GXL	S151 (1)
	SW16	3	PT034	WORK LT-0	BLU	ORG	18 AWG	GXL	X28 (23)
	SW16	4	EMPTY	EMPTY					
	SW16	5	EMPTY	EMPTY					
	SW16	6	EMPTY	EMPTY					
	SW16	7	EMPTY	EMPTY					
	SW16	8	EMPTY	EMPTY					
	SW17	1	EMPTY	EMPTY					
	SW17	2	PT034	ACC-211-1	YEL	BLK	18 AWG	GXL	S151 (1)
	SW17	3	PT034	BOOM LT-0	BLU	BLK	18 AWG	GXL	X28 (24)
	SW17	4	EMPTY	EMPTY					
	SW17	5	EMPTY	EMPTY					
	SW17	6	EMPTY	EMPTY					
	SW17	7	EMPTY	EMPTY					
	SW17	8	EMPTY	EMPTY					
	SW18	1	EMPTY	EMPTY					
	SW18	2	PT035	ACC-216-1	ORG	BLU	14 AWG	GXL	S168 (1)
	SW18	3	PT035	SP-7-3	GRY	BLU	14 AWG	GXL	S166 (1)
	SW18	4	EMPTY	EMPTY					
	SW18	5	EMPTY	EMPTY					
	SW18	6	EMPTY	EMPTY					
	SW18	7	EMPTY	EMPTY					
	SW18	8	EMPTY	EMPTY					
	SW19	1	EMPTY	EMPTY					
	SW19	2	PT035	ACC-217-1	ORG	VIO	14 AWG	GXL	S169 (1)
	SW19	3	PT035	SP-8-3	GRY	VIO	14 AWG	GXL	S167 (1)
	SW19	4	EMPTY	EMPTY					
	SW19	5	EMPTY	EMPTY					
	SW19	6	EMPTY	EMPTY					
	SW19	7	EMPTY	EMPTY					
	SW19	8	EMPTY	EMPTY					
	LB20-G	1	AT002	GND-10-2	BLK	-	16 AWG	GXL	S179 (1)
	LB20-S	1	AT002	ACC-211-3	ORG	BLK	16 AWG	GXL	S151 (1)
	SW21	1	DT009	WIPER H	PNK	LBL	14 AWG	GXL	WH15 (1)
	SW21	2	DT009	WIPER L	PNK	TAN	14 AWG	GXL	WH15 (2)
	SW21	3	DT009	WIPER P	PNK	GRY	14 AWG	GXL	WH15 (3)
	SW21	4	DT009	GND-10-4	BLK	-	14 AWG	GXL	S24 (1)
	SW21	5	DT008	WASH	PNK	RED	16 AWG	GXL	X28 (9)
	SW21	6	DT009	ACC-219-1	ORG	LGR	14 AWG	GXL	S29 (1)
	SW22-B	1	AT003	ACC-220	ORG	LBL	12 AWG	GXL	X28 (2)
	SW22-C	1	AT002	FAN C	VIO	BRN	16 AWG	GXL	X28 (13)
	SW22-H	1	AT003	FAN H	PNK	GRN	12 AWG	GXL	WH23 (D)
	SW22-L	1	AT003	FAN L	PNK	BLU	12 AWG	GXL	WH23 (F)
	SW22-M	1	AT003	FAN M	PNK	VIO	12 AWG	GXL	WH23 (E)
	WH23	A	DT051	PLUG					
	WH23	B	DT010	AC PWR-302	BRN	WHT	14 AWG	GXL	X28 (28)
	WH23	C	DT010	AC CLUTCH-1	PNK	ORG	14 AWG	GXL	X28 (16)
	WH23	D	DT010	FAN H	PNK	GRN	12 AWG	GXL	SW22-H (1)
	WH23	E	DT010	FAN M	PNK	VIO	12 AWG	GXL	SW22-M (1)
	WH23	F	DT010	FAN L	PNK	BLU	12 AWG	GXL	SW22-L (1)
	S24	1	SPLICE	GND-10-4	BLK	-	14 AWG	GXL	SW21 (4)
	S24	1	SPLICE	GND-10-4	BLK	-	14 AWG	GXL	WH15 (4)
	S24	2	SPLICE	GND-10-4	BLK	-	14 AWG	GXL	X28 (21)
	X28	1	DT010	ACC-219-0	ORG	LGR	12 AWG	GXL	S29 (2)
	X28	2	DT010	ACC-220	ORG	LBL	12 AWG	GXL	SW22-B (1)
	X28	3	DT010	CAB LT-303-0	BLU	BRN	12 AWG	GXL	S134 (2)
	X28	4	DT010	GND-10-1	BLK	-	12 AWG	GXL	S135 (2)
	X28	5	DT009	BAT-202-0	RED	ORG	14 AWG	GXL	S170 (1)
	X28	6	DT009	ACC-211-0	ORG	BLK	14 AWG	GXL	S151 (2)
	X28	7	DT009	ACC-212-0	ORG	WHT	14 AWG	GXL	S181 (2)
	X28	8	DT009	ACC-216-0	ORG	BLU	14 AWG	GXL	S168 (1)
	X28	9	DT008	WASH	PNK	RED	16 AWG	GXL	SW21 (5)
	X28	10	DT009	ACC-217-0	ORG	VIO	14 AWG	GXL	S169 (1)
	X28	11	DT008	BAT-207-0	RED	LGR	18 AWG	GXL	S162 (2)
	X28	12	DT008	HORN-0-0	BLU	RED	18 AWG	GXL	S163 (2)
	X28	13	DT008	FAN C	VIO	BRN	16 AWG	GXL	SW22-C (1)
	X28	14	DT008	PILOT SW	VIO	WHT	16 AWG	GXL	SN5 (C)
A	X28	15	DT008	TILT SPEED	WHT	GRN	18 AWG	GXL	JS4 (B)

CONNECTOR PIN OUT

REV	CONNECTOR DESIGNATION	CONN POS	TERMINAL INDEX #	WIRE DESIGNATION	WIRE COLOR	STRIPE COLOR	GAUGE	TYPE	TO
	X28	16	DT009	AC CLUTCH-1	PNK	ORG	14 AWG	GXL	WH23 (C)
	X28	17	DT009	GND-10-2	BLK	-	14 AWG	GXL	S179 (2)
	X28	18	DT007	GND-11	BLK	-	18 AWG	GXL	S122 (1)
	X28	19	DT009	GND-10-3	BLK	-	14 AWG	GXL	S180 (2)
A	X28	20	DT007	IGN-306-0	YEL	BLU	18 AWG	GXL	S115 (1)
	X28	21	DT009	GND-10-4	BLK	-	14 AWG	GXL	S24 (2)
	X28	22	DT009	SP-6-0	GRY	GRN	14 AWG	GXL	S160 (1)
	X28	23	DT007	WORK LT-0	BLU	ORG	18 AWG	GXL	SW16 (3)
	X28	24	DT007	BOOM LT-0	BLU	BLK	18 AWG	GXL	SW17 (3)
	X28	25	DT009	SP-7-0	GRY	BLU	14 AWG	GXL	S166 (1)
	X28	26	DT009	SP-8-0	GRY	VIO	14 AWG	GXL	S167 (1)
	X28	27	DT017	CAN2-0-0	YEL	-	18 AWG	GXL	S118 (2)
	X28	28	DT009	AC PWR-302	BRN	WHT	14 AWG	GXL	WH23 (B)
	X28	29	DT017	CAN2-0-0	GRN	-	18 AWG	GXL	S119 (2)
A	X28-1	1	SHRINK	SP-5-0	GRY	ORG	14 AWG	GXL	S159 (1)
	S29	1	SPLICE	ACC-219-1	ORG	LGR	14 AWG	GXL	SW21 (6)
	S29	1	SPLICE	ACC-219-2	ORG	LGR	14 AWG	GXL	WH15 (6)
	S29	2	SPLICE	ACC-219-0	ORG	LGR	12 AWG	GXL	X28 (1)
	X38	1	DT017	CAN2-0-4	YEL	-	18 AWG	GXL	S120 (1)
	X38	2	DT017	CAN2-0-4	GRN	-	18 AWG	GXL	S121 (1)
A	S115	1	SPLICE	IGN-306-0	YEL	BLU	18 AWG	GXL	X28 (20)
A	S115	2	SPLICE	IGN-306-2	YEL	BLU	18 AWG	GXL	JS1-1 (1)
A	S115	2	SPLICE	IGN-306-1	YEL	BLU	18 AWG	GXL	JS2-1 (1)
A	S115	2	SPLICE	IGN-306-3	YEL	BLU	18 AWG	GXL	SN5 (A)
	S118	1	SPLICE	CAN2-0-1	YEL	-	18 AWG	GXL	JS2-1 (11)
	S118	2	SPLICE	CAN2-0-2	YEL	-	18 AWG	GXL	S120 (2)
	S118	2	SPLICE	CAN2-0-0	YEL	-	18 AWG	GXL	X28 (27)
	S119	1	SPLICE	CAN2-0-1	GRN	-	18 AWG	GXL	JS2-1 (12)
	S119	2	SPLICE	CAN2-0-2	GRN	-	18 AWG	GXL	S121 (2)
	S119	2	SPLICE	CAN2-0-0	GRN	-	18 AWG	GXL	X28 (29)
	S120	1	SPLICE	CAN2-0-3	YEL	-	18 AWG	GXL	JS1-1 (11)
	S120	1	SPLICE	CAN2-0-4	YEL	-	18 AWG	GXL	X38 (1)
	S120	2	SPLICE	CAN2-0-2	YEL	-	18 AWG	GXL	S118 (2)
	S121	1	SPLICE	CAN2-0-3	GRN	-	18 AWG	GXL	JS1-1 (12)
	S121	1	SPLICE	CAN2-0-4	GRN	-	18 AWG	GXL	X38 (2)
	S121	2	SPLICE	CAN2-0-2	GRN	-	18 AWG	GXL	S119 (2)
	S122	1	SPLICE	GND-11	BLK	-	18 AWG	GXL	X28 (18)
	S122	2	SPLICE	GND-11	BLK	-	18 AWG	GXL	JS1-1 (2)
	S122	2	SPLICE	GND-11	BLK	-	18 AWG	GXL	JS2-1 (2)
	SW125	1	PT034	AUX 1 SW	GRN	GRY	18 AWG	GXL	JS2-1 (8)
	SW125	2	PT034	GND-JSR	BLK	VIO	18 AWG	GXL	S164 (2)
	SW125	3	PT034	AUX 2 SW	GRN	RED	18 AWG	GXL	JS2-1 (9)
	SW125	4	EMPTY	EMPTY					
	SW125	5	EMPTY	EMPTY					
	SW125	6	EMPTY	EMPTY					
	SW125	7	EMPTY	EMPTY					
	SW125	8	EMPTY	EMPTY					
	X132-1	1	SHRINK	ACC-217-2	ORG	VIO	14 AWG	GXL	S169 (1)
	X132-2	1	SHRINK	ACC-216-2	ORG	BLU	14 AWG	GXL	S168 (1)
	X132-3	1	SHRINK	SP-8-1	GRY	VIO	14 AWG	GXL	S167 (1)
	X132-4	1	SHRINK	SP-7-1	GRY	BLU	14 AWG	GXL	S166 (1)
	X132-5	1	SHRINK	SP-6-1	GRY	GRN	14 AWG	GXL	S160 (1)
	X132-6	1	SHRINK	SP-5-1	GRY	ORG	14 AWG	GXL	S159 (1)
	X132-7	1	SHRINK	BAT-202-1	RED	ORG	14 AWG	GXL	S170 (1)
	X132-8	1	SHRINK	GND-10-2	BLK	-	14 AWG	GXL	S179 (1)
	S134	1	SPLICE	CAB LT-303-1	BLU	BRN	14 AWG	GXL	LB13-P (1)
	S134	1	SPLICE	CAB LT-303-2	BLU	BRN	14 AWG	GXL	LB14-P (1)
	S134	2	SPLICE	CAB LT-303-0	BLU	BRN	12 AWG	GXL	X28 (3)
	S135	1	SPLICE	GND-10-1	BLK	-	14 AWG	GXL	LB13-G (1)
	S135	1	SPLICE	GND-10-1	BLK	-	14 AWG	GXL	LB14-G (1)
	S135	2	SPLICE	GND-10-1	BLK	-	12 AWG	GXL	X28 (4)
	S151	1	SPLICE	ACC-211-3	ORG	BLK	16 AWG	GXL	LB20-S (1)
	S151	1	SPLICE	ACC-211-2	YEL	BLK	18 AWG	GXL	SW16 (2)
	S151	1	SPLICE	ACC-211-1	YEL	BLK	18 AWG	GXL	SW17 (2)
	S151	2	SPLICE	ACC-211-4	ORG	BLK	16 AWG	GXL	LB12-S (1)
	S151	2	SPLICE	ACC-211-0	ORG	BLK	14 AWG	GXL	X28 (6)
	X158-1	1	SHRINK	ACC-217-3	ORG	VIO	14 AWG	GXL	S169 (2)
	X158-2	1	SHRINK	ACC-216-3	ORG	BLU	14 AWG	GXL	S168 (2)
	X158-3	1	SHRINK	SP-8-2	GRY	VIO	14 AWG	GXL	S167 (2)
	X158-4	1	SHRINK	SP-7-2	GRY	BLU	14 AWG	GXL	S166 (2)
	X158-5	1	SHRINK	SP-6-2	GRY	GRN	14 AWG	GXL	S160 (2)
	X158-6	1	SHRINK	SP-5-2	GRY	ORG	14 AWG	GXL	S159 (2)
	X158-7	1	SHRINK	BAT-202-3	RED	ORG	14 AWG	GXL	S170 (2)
	X158-8	1	SHRINK	GND-10-3	BLK	-	14 AWG	GXL	S180 (1)
B	X158-9	1	SHRINK	STROBE-5	BLU	PNK	16 AWG	GXL	LB9 (5)
B	X158-10	1	SHRINK	STROBE-4	BLU	GRY	16 AWG	GXL	LB9 (4)
B	X158-11	1	SHRINK	STROBE-3	BLU	LGR	16 AWG	GXL	LB9 (3)
A	S159	1	SPLICE	SP-5-1	GRY	ORG	14 AWG	GXL	X132-6 (1)
	S159	1	SPLICE	SP-5-0	GRY	ORG	14 AWG	GXL	X28-1 (1)
	S159	2	SPLICE	SP-5-2	GRY	ORG	14 AWG	GXL	X158-6 (1)
	S160	1	SPLICE	SP-6-1	GRY	GRN	14 AWG	GXL	X132-5 (1)
	S160	1	SPLICE	SP-6-0	GRY	GRN	14 AWG	GXL	X28 (22)
	S160	2	SPLICE	SP-6-2	GRY	GRN	14 AWG	GXL	X158-5 (1)
	S161	1	SPLICE	GND-JSL	BLK	GRN	18 AWG	GXL	JS1-1 (7)
	S161	1	SPLICE	GND-JSL	BLK	GRN	18 AWG	GXL	JS1-3 (2)
	S161	1	SPLICE	GND-JSL	BLK	GRN	18 AWG	GXL	JS1-3 (4)
	S161	1	SPLICE	GND-JSL	BLK	GRN	18 AWG	GXL	JS1-3 (7)

CONNECTOR PIN OUT

REV	CONNECTOR DESIGNATION	CONN POS	TERMINAL INDEX #	WIRE DESIGNATION	WIRE COLOR	STRIPE COLOR	GAUGE	TYPE	TO
	S161	2	SPLICE	GND-JSL	BLK	GRN	18 AWG	GXL	JS4 (C)
	S161	2	SPLICE	GND-JSL	BLK	GRN	18 AWG	GXL	SW3 (2)
	S162	1	SPLICE	BAT-207-2	RED	LGR	18 AWG	GXL	JS1-3 (5)
	S162	1	SPLICE	BAT-207-1	RED	LGR	18 AWG	GXL	JS2-4A (1)
	S162	2	SPLICE	BAT-207-0	RED	LGR	18 AWG	GXL	X28 (11)
	S163	1	SPLICE	HORN-0-2	BLU	RED	18 AWG	GXL	JS1-3 (6)
	S163	1	SPLICE	HORN-0-1	BLU	RED	18 AWG	GXL	JS2-4B (1)
	S163	2	SPLICE	HORN-0-0	BLU	RED	18 AWG	GXL	X28 (12)
	S164	1	SPLICE	GND-JSR	BLK	VIO	18 AWG	GXL	JS2-1 (7)
	S164	1	SPLICE	GND-JSR	BLK	VIO	18 AWG	GXL	JS2-3 (2)
	S164	1	SPLICE	GND-JSR	BLK	VIO	18 AWG	GXL	JS2-3 (4)
D	S164	1	SPLICE	GND-JSR	BLK	VIO	18 AWG	GXL	JS2-3 (5)
	S164	1	SPLICE	GND-JSR	BLK	VIO	18 AWG	GXL	JS2-3 (7)
	S164	2	SPLICE	GND-JSR	BLK	VIO	18 AWG	GXL	SW125 (2)
	S166	1	SPLICE	SP-7-3	GRY	BLU	14 AWG	GXL	SW18 (3)
	S166	1	SPLICE	SP-7-1	GRY	BLU	14 AWG	GXL	X132-4 (1)
	S166	1	SPLICE	SP-7-0	GRY	BLU	14 AWG	GXL	X28 (25)
	S166	2	SPLICE	SP-7-2	GRY	BLU	14 AWG	GXL	X158-4 (1)
	S167	1	SPLICE	SP-8-3	GRY	VIO	14 AWG	GXL	SW19 (3)
	S167	1	SPLICE	SP-8-1	GRY	VIO	14 AWG	GXL	X132-3 (1)
	S167	1	SPLICE	SP-8-0	GRY	VIO	14 AWG	GXL	X28 (26)
	S167	2	SPLICE	SP-8-2	GRY	VIO	14 AWG	GXL	X158-3 (1)
	S168	1	SPLICE	ACC-216-1	ORG	BLU	14 AWG	GXL	SW18 (2)
	S168	1	SPLICE	ACC-216-2	ORG	BLU	14 AWG	GXL	X132-2 (1)
	S168	1	SPLICE	ACC-216-0	ORG	BLU	14 AWG	GXL	X28 (8)
	S168	2	SPLICE	ACC-216-3	ORG	BLU	14 AWG	GXL	X158-2 (1)
	S169	1	SPLICE	ACC-217-1	ORG	VIO	14 AWG	GXL	SW19 (2)
	S169	1	SPLICE	ACC-217-2	ORG	VIO	14 AWG	GXL	X132-1 (1)
	S169	1	SPLICE	ACC-217-0	ORG	VIO	14 AWG	GXL	X28 (10)
B	S169	2	SPLICE	ACC-217-5	ORG	VIO	16 AWG	GXL	SW6 (2)
	S169	2	SPLICE	ACC-217-4	ORG	VIO	16 AWG	GXL	SW6 (5)
	S169	2	SPLICE	ACC-217-3	ORG	VIO	14 AWG	GXL	X158-1 (1)
	S170	1	SPLICE	BAT-202-1	RED	ORG	14 AWG	GXL	X132-7 (1)
	S170	1	SPLICE	BAT-202-0	RED	ORG	14 AWG	GXL	X28 (5)
	S170	2	SPLICE	BAT-202-2	RED	ORG	16 AWG	GXL	MS7-A (7)
	S170	2	SPLICE	BAT-202-3	RED	ORG	14 AWG	GXL	X158-7 (1)
	S179	1	SPLICE	GND-10-2	BLK	-	16 AWG	GXL	LB20-G (1)
	S179	1	SPLICE	GND-10-2	BLK	-	14 AWG	GXL	X132-8 (1)
	S179	2	SPLICE	GND-10-2	BLK	-	16 AWG	GXL	LB12-G (1)
	S179	2	SPLICE	GND-10-2	BLK	-	14 AWG	GXL	X28 (17)
	S180	1	SPLICE	GND-10-3	BLK	-	16 AWG	GXL	LB8-G (1)
B	S180	1	SPLICE	GND-10-3	BLK	-	16 AWG	GXL	SN5 (B)
	S180	1	SPLICE	GND-10-3	BLK	-	14 AWG	GXL	X158-8 (1)
	S180	2	SPLICE	GND-10-3	BLK	-	16 AWG	GXL	LB9 (6)
	S180	2	SPLICE	GND-10-3	BLK	-	16 AWG	GXL	MS7-A (8)
	S180	2	SPLICE	GND-10-3	BLK	-	14 AWG	GXL	X28 (19)
A	S181	1	SPLICE	ACC-212-2	ORG	WHT	16 AWG	GXL	LB8-S (1)
	S181	2	SPLICE	ACC-212-1	ORG	WHT	16 AWG	GXL	MS7-A (4)
	S181	2	SPLICE	ACC-212-0	ORG	WHT	14 AWG	GXL	X28 (7)

REV	ZONE	DATE	BY	ER NO.	DESCRIPTION	CHKD
D	ALL	16Sep16	AF	EC160290	UPDATED REVISED ITEMS ON TABLES.	RDM
C	B8	8Jan16	AF	EC160013	JS4 TERMIAL WAS PT020.	RAB
B	ALL	16Jul15	AF	E

DRAWING NUMBER
82173008

FROM-TO WIRE LIST

REV	WIRE NAME (REF ONLY)	WIRE DESIGNATION	FROM			TO			WIRE COLOR	STRIPE COLOR	GAUGE	TYPE
			CONNECTOR	PIN	TERM INDEX #	CONNECTOR	PIN	TERM INDEX #				
C	WIRE_1	5V PWR	JS1-1	4	DT008	JS4	A	PT010	WHT	BLK	18 AWG	GXL
	WIRE_2	AC CLUTCH-1	X28	16	DT009	WH23	C	DT010	PNK	ORG	14 AWG	GXL
	WIRE_3	AC PWR-302	X28	28	DT009	WH23	B	DT010	BRN	WHT	14 AWG	GXL
	WIRE_4	ACC-211-0	X28	6	DT009	S151	2	SPLICE	ORG	BLK	14 AWG	GXL
	WIRE_5	ACC-211-1	SW17	2	PT034	S151	1	SPLICE	YEL	BLK	18 AWG	GXL
	WIRE_6	ACC-211-2	SW16	2	PT034	S151	1	SPLICE	YEL	BLK	18 AWG	GXL
	WIRE_7	ACC-211-3	LB20-S	1	AT002	S151	1	SPLICE	ORG	BLK	16 AWG	GXL
	WIRE_8	ACC-211-4	S151	2	SPLICE	LB12-S	1	AT002	ORG	BLK	16 AWG	GXL
	WIRE_9	ACC-212-0	X28	7	DT009	S181	2	SPLICE	ORG	WHT	14 AWG	GXL
	WIRE_10	ACC-212-1	MS7-A	4	XT009	S181	2	SPLICE	ORG	WHT	16 AWG	GXL
A	WIRE_11	ACC-212-2	LB8-S	1	AT002	S181	1	SPLICE	ORG	WHT	16 AWG	GXL
	WIRE_12	ACC-216-0	X28	8	DT009	S168	1	SPLICE	ORG	BLU	14 AWG	GXL
	WIRE_13	ACC-216-1	SW18	2	PT035	S168	1	SPLICE	ORG	BLU	14 AWG	GXL
	WIRE_14	ACC-216-2	X132-2	1	SHRINK	S168	1	SPLICE	ORG	BLU	14 AWG	GXL
	WIRE_15	ACC-216-3	X158-2	1	SHRINK	S168	2	SPLICE	ORG	BLU	14 AWG	GXL
	WIRE_16	ACC-217-0	X28	10	DT009	S169	1	SPLICE	ORG	VIO	14 AWG	GXL
	WIRE_17	ACC-217-1	SW19	2	PT035	S169	1	SPLICE	ORG	VIO	14 AWG	GXL
	WIRE_18	ACC-217-2	X132-1	1	SHRINK	S169	1	SPLICE	ORG	VIO	14 AWG	GXL
	WIRE_19	ACC-217-3	X158-1	1	SHRINK	S169	2	SPLICE	ORG	VIO	14 AWG	GXL
	WIRE_21	ACC-217-4	SW6	5	PT035	S169	2	SPLICE	ORG	VIO	16 AWG	GXL
B	WIRE_20	ACC-217-5	SW6	2	PT035	S169	2	SPLICE	ORG	VIO	16 AWG	GXL
	WIRE_22	ACC-219-0	X28	1	DT010	S29	2	SPLICE	ORG	LGR	12 AWG	GXL
	WIRE_23	ACC-219-1	SW21	6	DT009	S29	1	SPLICE	ORG	LGR	14 AWG	GXL
	WIRE_24	ACC-219-2	WH15	6	DT009	S29	1	SPLICE	ORG	LGR	14 AWG	GXL
	WIRE_25	ACC-220	X28	2	DT010	SW22-B	1	AT003	ORG	LBL	12 AWG	GXL
	WIRE_26	AUX 1 SW	SW125	1	PT034	JS2-1	8	DT008	GRN	GRY	18 AWG	GXL
	WIRE_27	AUX 2 SW	SW125	3	PT034	JS2-1	9	DT008	GRN	RED	18 AWG	GXL
	WIRE_28	BAT-202-0	X28	5	DT009	S170	1	SPLICE	RED	ORG	14 AWG	GXL
	WIRE_29	BAT-202-1	X132-7	1	SHRINK	S170	1	SPLICE	RED	ORG	14 AWG	GXL
	WIRE_30	BAT-202-2	MS7-A	7	XT009	S170	2	SPLICE	RED	ORG	16 AWG	GXL
	WIRE_31	BAT-202-3	X158-7	1	SHRINK	S170	2	SPLICE	RED	ORG	14 AWG	GXL
	WIRE_32	BAT-207-0	X28	11	DT008	S162	2	SPLICE	RED	LGR	18 AWG	GXL
D	WIRE_33	BAT-207-1	JS2-4A	1	SHRINK	S162	1	SPLICE	RED	LGR	18 AWG	GXL
	WIRE_34	BAT-207-2	JS1-3	5	AT030	S162	1	SPLICE	RED	LGR	18 AWG	GXL
	WIRE_35	BOOM LT-0	SW17	3	PT034	X28	24	DT007	BLU	BLK	18 AWG	GXL
	WIRE_36	CAB LT-303-0	X28	3	DT010	S134	2	SPLICE	BLU	BRN	12 AWG	GXL
	WIRE_37	CAB LT-303-1	LB13-P	1	BUL	S134	1	SPLICE	BLU	BRN	14 AWG	GXL
	WIRE_38	CAB LT-303-2	LB14-P	1	BUL	S134	1	SPLICE	BLU	BRN	14 AWG	GXL
	WIRE_39	CAN2-0-0	X28	27	DT017	S118	2	SPLICE	YEL	-	18 AWG	GXL
	WIRE_44	CAN2-0-0	X28	29	DT017	S119	2	SPLICE	GRN	-	18 AWG	GXL
	WIRE_40	CAN2-0-1	JS2-1	12	DT018	S119	1	SPLICE	GRN	-	18 AWG	GXL
	WIRE_45	CAN2-0-1	JS2-1	11	DT018	S118	1	SPLICE	YEL	-	18 AWG	GXL
	WIRE_41	CAN2-0-2	S119	2	SPLICE	S121	2	SPLICE	GRN	-	18 AWG	GXL
	WIRE_46	CAN2-0-2	S118	2	SPLICE	S120	2	SPLICE	YEL	-	18 AWG	GXL
	WIRE_42	CAN2-0-3	JS1-1	12	DT018	S121	1	SPLICE	GRN	-	18 AWG	GXL
	WIRE_47	CAN2-0-3	JS1-1	11	DT018	S120	1	SPLICE	YEL	-	18 AWG	GXL
	WIRE_43	CAN2-0-4	X38	1	DT017	S120	1	SPLICE	YEL	-	18 AWG	GXL
	WIRE_48	CAN2-0-4	X38	2	DT017	S121	1	SPLICE	GRN	-	18 AWG	GXL
	WIRE_79	FAN C	SW22-C	1	AT002	X28	13	DT008	VIO	BRN	16 AWG	GXL
	WIRE_80	FAN H	SW22-H	1	AT003	WH23	D	DT010	PNK	GRN	12 AWG	GXL
	WIRE_81	FAN L	SW22-L	1	AT003	WH23	F	DT010	PNK	BLU	12 AWG	GXL
	WIRE_82	FAN M	SW22-M	1	AT003	WH23	E	DT010	PNK	VIO	12 AWG	GXL
	WIRE_83	GND-10-1	X28	4	DT010	S135	2	SPLICE	BLK	-	12 AWG	GXL
	WIRE_106	GND-10-1	LB13-G	1	BUL	S135	1	SPLICE	BLK	-	14 AWG	GXL
	WIRE_113	GND-10-1	LB14-G	1	BUL	S135	1	SPLICE	BLK	-	14 AWG	GXL
	WIRE_84	GND-10-2	LB20-G	1	AT002	S179	1	SPLICE	BLK	-	16 AWG	GXL
	WIRE_107	GND-10-2	X28	17	DT009	S179	2	SPLICE	BLK	-	14 AWG	GXL
	WIRE_114	GND-10-2	X132-8	1	SHRINK	S179	1	SPLICE	BLK	-	14 AWG	GXL
	WIRE_120	GND-10-2	S179	2	SPLICE	LB12-G	1	AT002	BLK	-	16 AWG	GXL
	WIRE_85	GND-10-3	X28	19	DT009	S180	2	SPLICE	BLK	-	14 AWG	GXL
B	WIRE_87	GND-10-3	SN5	B	PT006	S180	1	SPLICE	BLK	-	16 AWG	GXL
	WIRE_108	GND-10-3	LB9	6	DT008	S180	2	SPLICE	BLK	-	16 AWG	GXL
	WIRE_115	GND-10-3	X158-8	1	SHRINK	S180	1	SPLICE	BLK	-	14 AWG	GXL
	WIRE_121	GND-10-3	LB8-G	1	AT002	S180	1	SPLICE	BLK	-	16 AWG	GXL
	WIRE_124	GND-10-3	MS7-A	8	XT009	S180	2	SPLICE	BLK	-	16 AWG	GXL
	WIRE_86	GND-10-4	X28	21	DT009	S24	2	SPLICE	BLK	-	14 AWG	GXL
	WIRE_109	GND-10-4	SW21	4	DT009	S24	1	SPLICE	BLK	-	14 AWG	GXL
	WIRE_116	GND-10-4	WH15	4	DT009	S24	1	SPLICE	BLK	-	14 AWG	GXL
	WIRE_88	GND-11	X28	18	DT007	S122	1	SPLICE	BLK	-	18 AWG	GXL

FROM-TO WIRE LIST

REV	WIRE NAME (REF ONLY)	WIRE DESIGNATION	FROM			TO			WIRE COLOR	STRIPE COLOR	GAUGE	TYPE
			CONNECTOR	PIN	TERM INDEX #	CONNECTOR	PIN	TERM INDEX #				
	WIRE_110	GND-11	JS2-1	2	DT008	S122	2	SPLICE	BLK	-	18 AWG	GXL
	WIRE_117	GND-11	JS1-1	2	DT008	S122	2	SPLICE	BLK	-	18 AWG	GXL
	WIRE_89	GND-JSL	JS1-1	7	DT008	S161	1	SPLICE	BLK	GRN	18 AWG	GXL
	WIRE_111	GND-JSL	JS1-3	2	AT030	S161	1	SPLICE	BLK	GRN	18 AWG	GXL
	WIRE_118	GND-JSL	JS1-3	4	AT030	S161	1	SPLICE	BLK	GRN	18 AWG	GXL
	WIRE_122	GND-JSL	JS1-3	7	AT030	S161	1	SPLICE	BLK	GRN	18 AWG	GXL
	WIRE_125	GND-JSL	SW3	2	PT034	S161	2	SPLICE	BLK	GRN	18 AWG	GXL
C	WIRE_127	GND-JSL	JS4	C	PT010	S161	2	SPLICE	BLK	GRN	18 AWG	GXL
	WIRE_90	GND-JSR	JS2-1	7	DT008	S164	1	SPLICE	BLK	VIO	18 AWG	GXL
	WIRE_112	GND-JSR	JS2-3	2	AT030	S164	1	SPLICE	BLK	VIO	18 AWG	GXL
	WIRE_119	GND-JSR	JS2-3	4	AT030	S164	1	SPLICE	BLK	VIO	18 AWG	GXL
	WIRE_123	GND-JSR	JS2-3	7	AT030	S164	1	SPLICE	BLK	VIO	18 AWG	GXL
	WIRE_126	GND-JSR	S164	2	SPLICE	SW125	2	PT034	BLK	VIO	18 AWG	GXL
D	WIRE_564	GND-JSR	JS2-3	5	AT030	S164	1	SPLICE	BLK	VIO	18 AWG	GXL
	WIRE_91	HORN-0-0	X28	12	DT008	S163	2	SPLICE	BLU	RED	18 AWG	GXL
D	WIRE_92	HORN-0-1	JS2-4B	1	SHRINK	S163	1	SPLICE	BLU	RED	18 AWG	GXL
	WIRE_93	HORN-0-2	JS1-3	6	AT030	S163	1	SPLICE	BLU	RED	18 AWG	GXL
A	WIRE_94	IGN-306-0	X28	20	DT007	S115	1	SPLICE	YEL	BLU	18 AWG	GXL
A	WIRE_95	IGN-306-1	JS2-1	1	DT008	S115	2	SPLICE	YEL	BLU	18 AWG	GXL
A	WIRE_96	IGN-306-2	JS1-1	1	DT008	S115	2	SPLICE	YEL	BLU	18 AWG	GXL
A	WIRE_97	IGN-306-3	SN5	A	PT006	S115	2	SPLICE	YEL	BLU	18 AWG	GXL
	WIRE_98	JSL SW B	JS1-3	8	AT030	JS1-2	4	DT008	GRN	YEL	18 AWG	GXL
	WIRE_99	JSL SW LEFT	JS1-3	1	AT030	JS1-2	2	DT008	GRN	BLU	18 AWG	GXL
	WIRE_100	JSL SW RIGHT	JS1-3	3	AT030	JS1-2	3	DT008	GRN	VIO	18 AWG	GXL
D	WIRE_552	JSR SW A	JS2-3	6	AT030	JS2-2	1	DT008	GRN	PNK	18 AWG	GXL
	WIRE_101	JSR SW B	JS2-3	8	AT030	JS2-2	4	DT008	GRN	BRN	18 AWG	GXL
	WIRE_102	JSR SW LEFT	JS2-3	1	AT030	JS2-2	2	DT008	GRN	LGR	18 AWG	GXL
	WIRE_103	JSR SW RIGHT	JS2-3	3	AT030	JS2-2	3	DT008	GRN	LBL	18 AWG	GXL
	WIRE_104	PARK BRAKE	SW3	3	PT034	JS1-1	8	DT008	GRN	TAN	18 AWG	GXL
	WIRE_105	PILOT SW	SN5	C	PT006	X28	14	DT008	VIO	WHT	16 AWG	GXL
A	WIRE_50	SP-5-0	X28-1	1	SHRINK	S159	1	SPLICE	GRY	ORG	14 AWG	GXL
	WIRE_51	SP-5-1	X132-6	1	SHRINK	S159	1	SPLICE	GRY	ORG	14 AWG	GXL
	WIRE_52	SP-5-2	X158-6	1	SHRINK	S159	2	SPLICE	GRY	ORG	14 AWG	GXL
	WIRE_53	SP-6-0	X28	22	DT009	S160	1	SPLICE	GRY	GRN	14 AWG	GXL
	WIRE_54	SP-6-1	X132-5	1	SHRINK	S160	1	SPLICE	GRY	GRN	14 AWG	GXL
	WIRE_55	SP-6-2	X158-5	1	SHRINK	S160	2	SPLICE	GRY	GRN	14 AWG	GXL
	WIRE_56	SP-7-0	X28	25	DT009	S166	1	SPLICE	GRY	BLU	14 AWG	GXL
	WIRE_57	SP-7-1	X132-4	1	SHRINK	S166	1	SPLICE	GRY	BLU	14 AWG	GXL
	WIRE_58	SP-7-2	X158-4	1	SHRINK	S166	2	SPLICE	GRY	BLU	14 AWG	GXL
	WIRE_59	SP-7-3	SW18	3	PT035	S166	1	SPLICE	GRY	BLU	14 AWG	GXL
	WIRE_60	SP-8-0	X28	26	DT009	S167	1	SPLICE	GRY	VIO	14 AWG	GXL
	WIRE_61	SP-8-1	X132-3	1	SHRINK	S167	1	SPLICE	GRY	VIO	14 AWG	GXL
	WIRE_62	SP-8-2	X158-3	1	SHRINK	S167	2	SPLICE	GRY	VIO	14 AWG	GXL
	WIRE_63	SP-8-3	SW19	3	PT035	S167	1	SPLICE	GRY	VIO	14 AWG	GXL
B	WIRE_64	STROBE-1-0	LB9	1	DT008	SW6	3	PT036	BLU	TAN	16 AWG	GXL
B	WIRE_65	STROBE-1-1	SW6	1	PT035	SW6	3	PT036	BLU	TAN	16 AWG	GXL
B	WIRE_66	STROBE-2	LB9	2	DT008	SW6	4	PT035	BLU	LBL	16 AWG	GXL
B	WIRE_67	STROBE-3	LB9	3	DT008	X158-11	1	SHRINK	BLU	LGR	16 AWG	GXL
B	WIRE_68	STROBE-4	LB9	4	DT008	X158-10	1	SHRINK	BLU	GRY	16 AWG	GXL
B	WIRE_69	STROBE-5	LB9	5	DT008	X158-9	1	SHRINK	BLU	PNK	16 AWG	GXL
C	WIRE_70	TILT SPEED	JS4	B	PT010	X28	15	DT008	WHT	GRN	18 AWG	GXL
A	WIRE_71	TP-LT SPKR	MS7-B	7	XT009	MS11-P	1	AT002	PNK	BRN	16 AWG	GXL
A	WIRE_77	TP-LT SPKR	MS7-B	8	XT009	MS11-N	1	AT002	BLK	BRN	16 AWG	GXL
A	WIRE_72	TP-RT SPKR	MS7-B	1	XT009	MS10-P	1	AT002	PNK	LGR	16 AWG	GXL
A	WIRE_78	TP-RT SPKR	MS7-B	2	XT009	MS10-N	1	AT002	BLK	LGR	16 AWG	GXL
	WIRE_73	WASH	SW21	5	DT008	X28	9	DT008	PNK	RED	16 AWG	GXL
	WIRE_74	WIPER H	SW21	1	DT009	WH15	1	DT009	PNK	LBL	14 AWG	GXL
	WIRE_75	WIPER L	SW21	2	DT009	WH15	2	DT009	PNK	TAN	14 AWG	GXL
	WIRE_76	WIPER P	SW21	3	DT009	WH15	3	DT009	PNK	GRY	14 AWG	GXL
	WIRE_49	WORK LT-0	SW16	3	PT034	X28	23	DT007	BLU	ORG	18 AWG	GXL

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2) ALL DIMENSIONS ARE IN INCHES.

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REV	ZONE	DATE	BY	ER NO.	DESCRIPTION	CHKD
D	ALL	16Sep16	AF	EC160290	UPDATED REVISED ITEMS ON TABLES	RDM
C	ALL	8Jan16	AF	EC160013	JS4 TERMIAL WAS PT020.	RAB
B	ALL	16Jul15	AF	EC150273	UPDATED REVISED ITEMS ON TABLES	RAB
A	ALL	24Mar15	EFF	EC150122	UPDATED REVISED ITEMS ON TABLES	AF

REVISIONS

SPECIFICATIONS
1) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2) ALL WELDING TO STRUCTURAL WELD CODE-STEEL ANSI/AWS D1.1
3) ALL DIMENSIONAL TOLERANCES ARE ± .060
4) MACHINE TOLERANCE TO BE ± .015
5) ALL ANGLES ± 1°
6) MACH. SURF. 125 MAX

NEXT ASSY 82165001

DRAWN BY:	EFF
DATE:	19-Sep-14
CHK'D BY:	AF
DATE:	19-Sep-14
ER NO.:	SO3259735-57
CAGE CODE:	
SIMILAR TO:	
FINISH COAT REQ:	N

GRADALL

TITLE: HARNESS, UPPER CAB

MATL: SEE PARTS LIST

SIZE D | DWG NO. 82173008 | REV D

SCALE: 3/32 | EST WT: 14.6# | SHEET: 5 OF 5

DRAWING NUMBER	REV.
82173013	B

DRAWING NUMBER
82173013

CONNECTOR PIN OUT

REV	CONNECTOR DESIGNATION	CONN POS	TERMINAL INDEX #	WIRE DESIGNATION	WIRE COLOR	STRIPE COLOR	GAUGE	TYPE	TO
	X49	A	DT002	IGN-4-0	YEL	ORG	16 AWG	GXL	SI36 (1)
	X49	B	DT002	IGN-1	YEL	BLK	18 AWG	GXL	X129 (4)
	X49	C	DT002	UP BAT	RED	BLK	18 AWG	GXL	SW143 (1)
	X49	D	DT002	BAT-2	RED	BRN	16 AWG	GXL	X201 (2)
	X49	E	DT002	BAT-4	RED	BLU	16 AWG	GXL	X201 (3)
	X49	F	DT002	STROBE-1	BLU	BLK	16 AWG	GXL	X201 (4)
	X49	G	DT002	STROBE-2	BLU	WHT	16 AWG	GXL	X201 (5)
	X49	H	DT002	STROBE-3	BLU	RED	16 AWG	GXL	X201 (6)
	X49	J	DT002	STROBE-4	BLU	YEL	16 AWG	GXL	X201 (7)
	X49	K	DT002	STROBE-5	BLU	ORG	16 AWG	GXL	X201 (8)
	X49	L	DT051	PLUG					
	X49	M	DT051	PLUG					
	X49	N	DT051	PLUG					
B	X49	O	DT014	CAN1-0	YEL	-	18 AWG	GXL	EC130 (1)
B	X49	P	DT014	CAN1-0	GRN	-	18 AWG	GXL	EC130 (2)
	X49	Q	DT002	TRAVEL SW	GRN	WHT	18 AWG	GXL	SW143 (6)
	X49	R	DT002	REMOTE SW	GRN	BLK	18 AWG	GXL	SW143 (4)
	X49	S	DT002	TRAVEL-0	TAN	BLK	18 AWG	GXL	SW143 (7)
	X49	T	DT002	REMOTE-1	BRN	YEL	18 AWG	GXL	SW143 (10)
	X49	U	DT002	UP START	BRN	BLK	18 AWG	GXL	X129 (3)
	X49	V	DT002	GND-3-1	BLK	-	16 AWG	GXL	X201 (11)
	X49	W	DT002	GND-3-2	BLK	-	16 AWG	GXL	X201 (12)
	X49	X	DT002	GND-3-3	BLK	-	16 AWG	GXL	SI38 (1)
	X129	1	AT030	BAT	RED	-	18 AWG	GXL	SW143 (2)
A	X129	2	AT030	CH BAT	RED	YEL	18 AWG	GXL	SW143 (3)
	X129	3	AT030	UP START	BRN	BLK	18 AWG	GXL	X49 (U)
	X129	4	AT030	IGN-1	YEL	BLK	18 AWG	GXL	X49 (B)
	X129	5	EMPTY	EMPTY					
	X129	6	EMPTY	EMPTY					
	X129	7	EMPTY	EMPTY					
	X129	8	EMPTY	EMPTY					
	X129	9	AT030	GND-3-3	BLK	-	18 AWG	GXL	SI38 (2)
B	EC130	1	DT013	CAN1-0	YEL	-	18 AWG	GXL	X49 (O)
B	EC130	2	DT013	CAN1-0	GRN	-	18 AWG	GXL	X49 (P)
	SI36	1	SPLICE	IGN-4-0	YEL	ORG	16 AWG	GXL	X49 (A)
	SI36	2	SPLICE	IGN-4-2	YEL	ORG	18 AWG	GXL	SW143 (8)
	SI36	2	SPLICE	IGN-4-1	YEL	ORG	16 AWG	GXL	X201 (1)
	SI38	1	SPLICE	GND-3-3	BLK	-	16 AWG	GXL	X49 (X)
	SI38	2	SPLICE	GND-3-3	BLK	-	18 AWG	GXL	SW143 (5)
	SI38	2	SPLICE	GND-3-3	BLK	-	18 AWG	GXL	SW143 (9)
	SI38	2	SPLICE	GND-3-3	BLK	-	18 AWG	GXL	X129 (9)
A	SW143	1	PT034	UP BAT	RED	BLK	18 AWG	GXL	X49 (C)
	SW143	2	PT034	BAT	RED	-	18 AWG	GXL	X129 (1)
A	SW143	3	PT034	CH BAT	RED	YEL	18 AWG	GXL	X129 (2)
A	SW143	4	PT034	REMOTE SW	GRN	BLK	18 AWG	GXL	X49 (R)
	SW143	5	PT034	GND-3-3	BLK	-	18 AWG	GXL	SI38 (2)
A	SW143	6	PT034	TRAVEL SW	GRN	WHT	18 AWG	GXL	X49 (Q)
	SW143	7	PT034	TRAVEL-0	TAN	BLK	18 AWG	GXL	X49 (S)
	SW143	8	PT034	IGN-4-2	YEL	ORG	18 AWG	GXL	SI36 (2)
	SW143	9	PT034	GND-3-3	BLK	-	18 AWG	GXL	SI38 (2)
	SW143	10	PT034	REMOTE-1	BRN	YEL	18 AWG	GXL	X49 (T)
	X201	1	DT008	IGN-4-1	YEL	ORG	16 AWG	GXL	SI36 (2)
	X201	2	DT008	BAT-2	RED	BRN	16 AWG	GXL	X49 (D)
	X201	3	DT008	BAT-4	RED	BLU	16 AWG	GXL	X49 (E)
	X201	4	DT008	STROBE-1	BLU	BLK	16 AWG	GXL	X49 (F)
	X201	5	DT008	STROBE-2	BLU	WHT	16 AWG	GXL	X49 (G)
	X201	6	DT008	STROBE-3	BLU	RED	16 AWG	GXL	X49 (H)
	X201	7	DT008	STROBE-4	BLU	YEL	16 AWG	GXL	X49 (J)
	X201	8	DT008	STROBE-5	BLU	ORG	16 AWG	GXL	X49 (K)
	X201	9	DT051	PLUG					
	X201	10	DT051	PLUG					
	X201	11	DT008	GND-3-1	BLK	-	16 AWG	GXL	X49 (V)
	X201	12	DT008	GND-3-2	BLK	-	16 AWG	GXL	X49 (W)

FROM-TO WIRE LIST

REV	WIRE NAME (REF ONLY)	WIRE DESIGNATION	FROM			TO			WIRE COLOR	STRIPE COLOR	GAUGE	TYPE
			CONNECTOR	PIN	TERM INDEX #	CONNECTOR	PIN	TERM INDEX #				
	WIRE_590	BAT	SW143	2	PT034	X129	1	AT030	RED	-	18 AWG	GXL
	WIRE_405	BAT-2	X201	2	DT008	X49	D	DT002	RED	BRN	16 AWG	GXL
	WIRE_406	BAT-4	X201	3	DT008	X49	E	DT002	RED	BLU	16 AWG	GXL
B	WIRE_578	CAN1-0	EC130	1	DT013	X49	O	DT014	YEL	-	18 AWG	GXL
B	WIRE_577	CAN1-0	EC130	2	DT013	X49	P	DT014	GRN	-	18 AWG	GXL
	WIRE_589	CH BAT	SW143	3	PT034	X129	2	AT030	RED	YEL	18 AWG	GXL
	WIRE_409	GND-3-1	X49	V	DT002	X201	11	DT008	BLK	-	16 AWG	GXL
	WIRE_408	GND-3-2	X49	W	DT002	X201	12	DT008	BLK	-	16 AWG	GXL
	WIRE_597	GND-3-3	SW143	5	PT034	SI38	2	SPLICE	BLK	-	18 AWG	GXL
	WIRE_454	GND-3-3	SW143	9	PT034	SI38	2	SPLICE	BLK	-	18 AWG	GXL
	WIRE_417	GND-3-3	X129	9	AT030	SI38	2	SPLICE	BLK	-	18 AWG	GXL
	WIRE_453	GND-3-3	X49	X	DT002	SI38	1	SPLICE	BLK	-	18 AWG	GXL
	WIRE_592	IGN-1	X49	B	DT002	X129	4	AT030	YEL	BLK	18 AWG	GXL
	WIRE_407	IGN-4-0	X49	A	DT002	SI36	1	SPLICE	YEL	ORG	16 AWG	GXL
	WIRE_451	IGN-4-1	X201	1	DT008	SI36	2	SPLICE	YEL	ORG	16 AWG	GXL
	WIRE_452	IGN-4-2	SW143	8	PT034	SI36	2	SPLICE	YEL	ORG	18 AWG	GXL
A	WIRE_594	REMOTE SW	X49	R	DT002	SW143	4	PT034	GRN	BLK	18 AWG	GXL
	WIRE_593	REMOTE-1	X49	T	DT002	SW143	10	PT034	BRN	YEL	18 AWG	GXL
	WIRE_400	STROBE-1	X201	4	DT008	X49	F	DT002	BLU	BLK	16 AWG	GXL
	WIRE_401	STROBE-2	X201	5	DT008	X49	G	DT002	BLU	WHT	16 AWG	GXL
	WIRE_402	STROBE-3	X201	6	DT008	X49	H	DT002	BLU	RED	16 AWG	GXL
	WIRE_403	STROBE-4	X201	7	DT008	X49	J	DT002	BLU	YEL	16 AWG	GXL
	WIRE_404	STROBE-5	X201	8	DT008	X49	K	DT002	BLU	ORG	16 AWG	GXL
A	WIRE_595	TRAVEL SW	SW143	6	PT034	X49	Q	DT002	GRN	WHT	18 AWG	GXL
A	WIRE_399	TRAVEL-0	X49	S	DT002	SW143	7	PT034	TAN	BLK	18 AWG	GXL
	WIRE_596	UP BAT	SW143	1	PT034	X49	C	DT002	RED	BLK	18 AWG	GXL
	WIRE_591	UP START	X49	U	DT002	X129	3	AT030	BRN	BLK	18 AWG	GXL

CONNECTOR PARTS LIST

REV	ITEM	QTY	GRADALL PART NUMBER (REF)	VENDOR	DESCRIPTION
	1	1	-	AMP# 1-480706-0	CONNECTOR, UNV. MATE-N-LOK, 9 POS. PLUG, MATRIX
	2	1	-	CARLING# VC1-01	CONNECTOR, ROCKER SWITCH, 10F
	3	1	91504046	DEUTSCH# DT06-12SA	CONNECTOR, DT, PLUG 12S A KEY
B	4	1	88991146	DEUTSCH# DTM04-2P	CONNECTOR, DTM, RECPT. 2P
	5	1	-	DEUTSCH# HDP26-24-23PE	CONNECTOR, HDP20, PLUG 24-23P E SEAL, REVERSE
	6	1	VA2139-0066	DEUTSCH# W12S	CONNECTOR, WEDGE, ORANGE, 12S
B	7	1	88991182	DEUTSCH# WM-2PB	CONNECTOR, WEDGE, BLACK, 2P

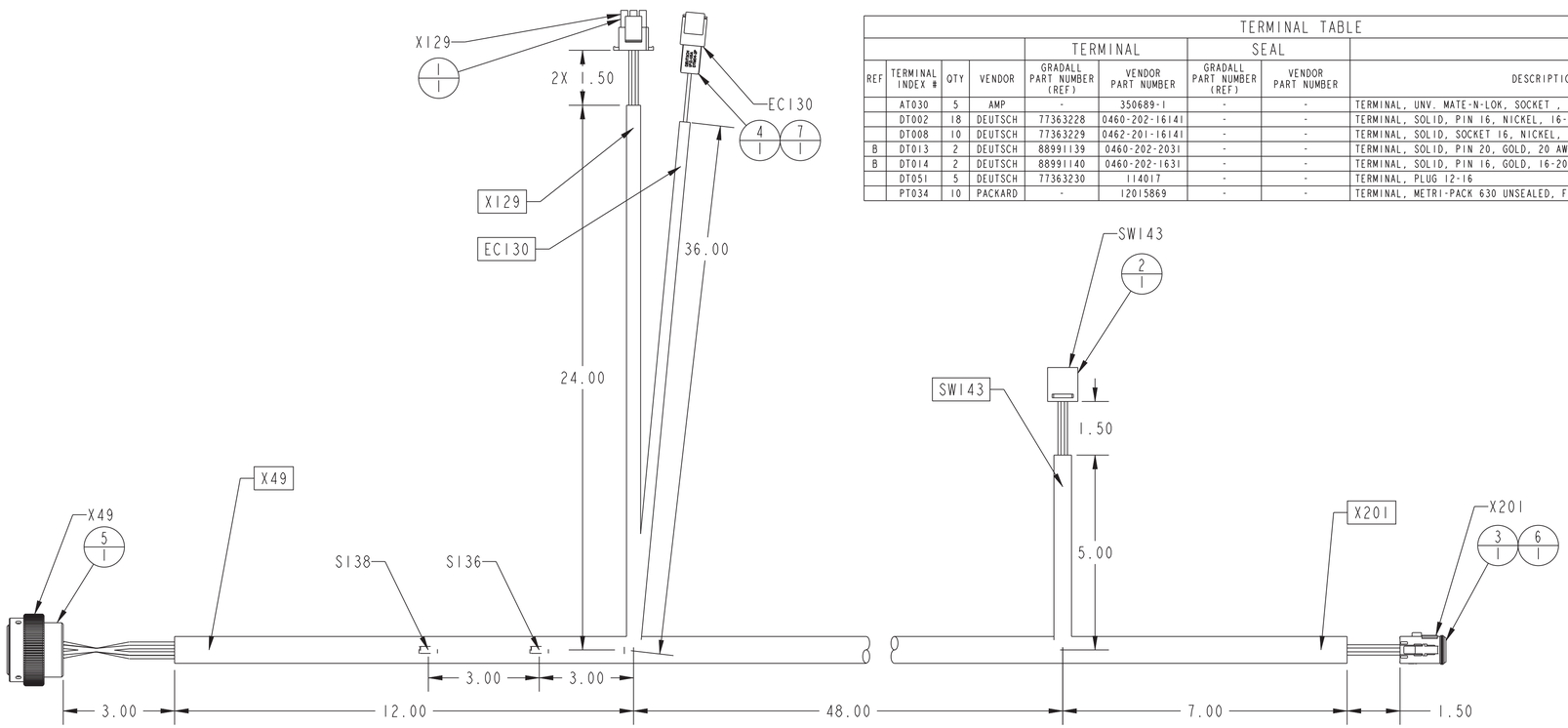
* INDICATES EQUIVALENT PART MAY BE USED.

TWISTED WIRES:
ALL WIRES WITH DESIGNATIONS BEGINNING WITH CAN, TP, OR TT ARE TWISTED WIRES.
ALL TWISTED WIRES SHALL HAVE A MINIMUM TWIST OF 1.5 TWISTS PER INCH.

CAN: SHALL BE A YELLOW AND GREEN TWISTED PAIR.
TP: SHALL BE A TWISTED PAIR, WIRE COLOR AS INDICATED.
TT: SHALL BE TWISTED TRIAD, WIRE COLOR AS INDICATED.
USB CABLE: SHALL BE CABLE SUPPLIED WITH USB CONNECTOR/CABLE ASSEMBLY.

TERMINAL TABLE

REF	TERMINAL INDEX #	QTY	VENDOR	TERMINAL: GRADALL PART NUMBER (REF)	TERMINAL: VENDOR PART NUMBER	SEAL: GRADALL PART NUMBER (REF)	SEAL: VENDOR PART NUMBER	DESCRIPTION
	AT030	5	AMP	-	350689-1	-	-	TERMINAL, UNV. MATE-N-LOK, SOCKET , TIN, 18-24 AWG
	DT002	18	DEUTSCH	77363228	0460-202-16141	-	-	TERMINAL, SOLID, PIN 16, NICKEL, 16-20 AWG
	DT008	10	DEUTSCH	77363229	0462-201-16141	-	-	TERMINAL, SOLID, SOCKET 16, NICKEL, 16-20 AWG
B	DT013	2	DEUTSCH	88991139	0460-202-2031	-	-	TERMINAL, SOLID, PIN 20, GOLD, 20 AWG
B	DT014	2	DEUTSCH	88991140	0460-202-1631	-	-	TERMINAL, SOLID, PIN 16, GOLD, 16-20 AWG
	DT051	5	DEUTSCH	77363230	114017	-	-	TERMINAL, PLUG 12-16
	PT034	10	PACKARD	-	12015869	-	-	TERMINAL, METRI-PACK 630 UNSEALED, FEMALE, TIN, 18-20 AWG



NOTES: (UNLESS OTHERWISE SPECIFIED)

1. HARNESS SHALL BE MANUFACTURED TO GRADALL ELECTRICAL SPECIFICATION 77319050 UNLESS OTHERWISE SPECIFIED.
2. ALL WIRES SHALL CONFORM TO SAE J1128, TYPE AS INDICATED.
   12 GAUGE WIRE TO BE TYPE GXL, 19/25 STRANDING.
   14 GAUGE WIRE TO BE TYPE GXL, 19/27 STRANDING.
   16 GAUGE WIRE TO BE TYPE GXL, 19/29 STRANDING.
   18 GAUGE WIRE TO BE TYPE GXL, 16/30 STRANDING.
   20 GAUGE WIRE TO BE TYPE GXL, 7/28 STRANDING.
3. WRAP HARNESS WITH WOVEN NYLON LOOM.
4. TAPE SLITTED CORRUGATED CONDUIT AT ALL ENDS AND EVERY 4" ALONG LENGTH.
5. ALL UNINSULATED TERMINALS SHALL BE COVERED BY INSULATING MATERIAL OR HOUSING.
6. ALL SPLICES SHALL BE ULTRASONICALLY WELDED OR SOLDERED.
7. ALL SPLICED CONNECTIONS SHALL BE WATERTIGHT, INSULATED, AND NO LESS THAN 1" FROM OTHER SPLICES OR BRANCHES.
8. WIRE DESIGNATIONS TO BE VISIBLY HOT-STAMPED ON WIRE ENDS.
9. DESIGNATION LABELS ARE SHOWN IN BOXED NOTES (ARROW SHOWING PLACEMENT OF LABEL). THEY SHOULD BE THE WRAP-AROUND KIND (NOT FLAG STYLE), WITH A PERMANENT WEATHER AND OIL RESISTANT MATERIAL. THIS IS FOR ASSEMBLY AND TROUBLESHOOTING PURPOSES.
10. TERMINAL PART NUMBERS FOR REFERENCE. ALTERNATE PART NUMBERS MAY BE USED BASED ON HARNESS MANUFACTURING PROCESSES.
11. LENGTH TOLERANCES FOR TOTAL BRANCH RUNS:
    UP TO 6.00 _ _ _ _ ±0.50
    6.00 TO 36.00 _ _ _ _ +1.00/-0.50
    36.00 AND UP _ _ _ _ +2.00/-0.50
12. WIRES NOT IN LOOM SHALL BE ZIP TIED TOGETHER INTO BUNDLES AS SHOWN AND WITH FOLLOWING INSTRUCTIONS:
    -ALL BRANCHES SHALL HAVE A ZIP TIE AT BASE OF BRANCH.
    -NO ZIP TIES WITHIN 3" TO 4" OF A CONNECTOR (UNLESS OTHERWISE SPECIFIED).
    -ZIP TIES SHALL BE PLACED AT A MAXIMUM OF EVER 3" ALONG THEIR LENGTHS.
    -THERE SHALL BE NO BUNDLE OF WIRES LONGER THAT 3" (UNLESS UNDER LOOM OR A SINGLE WIRE) WITHOUT ZIP TIES.
13. HARNESS SHALL BE IDENTIFIED WITH GRADALL PART NUMBER, REVISION, VENDOR PART NUMBER, AND BUILD CODE.
14. ALL CIRCUITS MUST BE ELECTRICALLY TESTED FOR CONTINUITY AND CORRECT POSITION. ALL DIODES TO BE TESTED FOR CORRECT BIASING.

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REV	ZONE	DATE	BY	ER NO.	DESCRIPTION	CHKD
B	ALL	05May16	EFF	EC160071	ADDED EC130, UPDATED ALL RELATED TABLES.	AF
A	ALL	23Mar15	EFF	EC150122	CHANGED PIN OU ON SW143. UPDATED ALL RELATED TABLES. CHANGED NOTE 9.	AF

REVISIONS

SPECIFICATIONS
1) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2) ALL WELDING TO STRUCTURAL WELD CODE-STEEL ANSI/AWS D1.1
3) ALL DIMENSIONAL TOLERANCES ARE ± .060
4) MACHINE TOLERANCE TO BE ± .015
5) ALL ANGLES ± 1°
6) MACH. SURF. 125 MAX

NEXT ASSY: 82189003

DRAWN BY:	EFF
DATE:	03-Oct-14
CHK'D BY:	AF
DATE:	03-Oct-14
ER NO.:	S03259735-52
CAGE CODE:	
SIMILAR TO:	
FINISH COAT REQ:	N

GRADALL

TITLE: HARNESS, CHASSIS CAB

MATL: SEE PARTS LIST

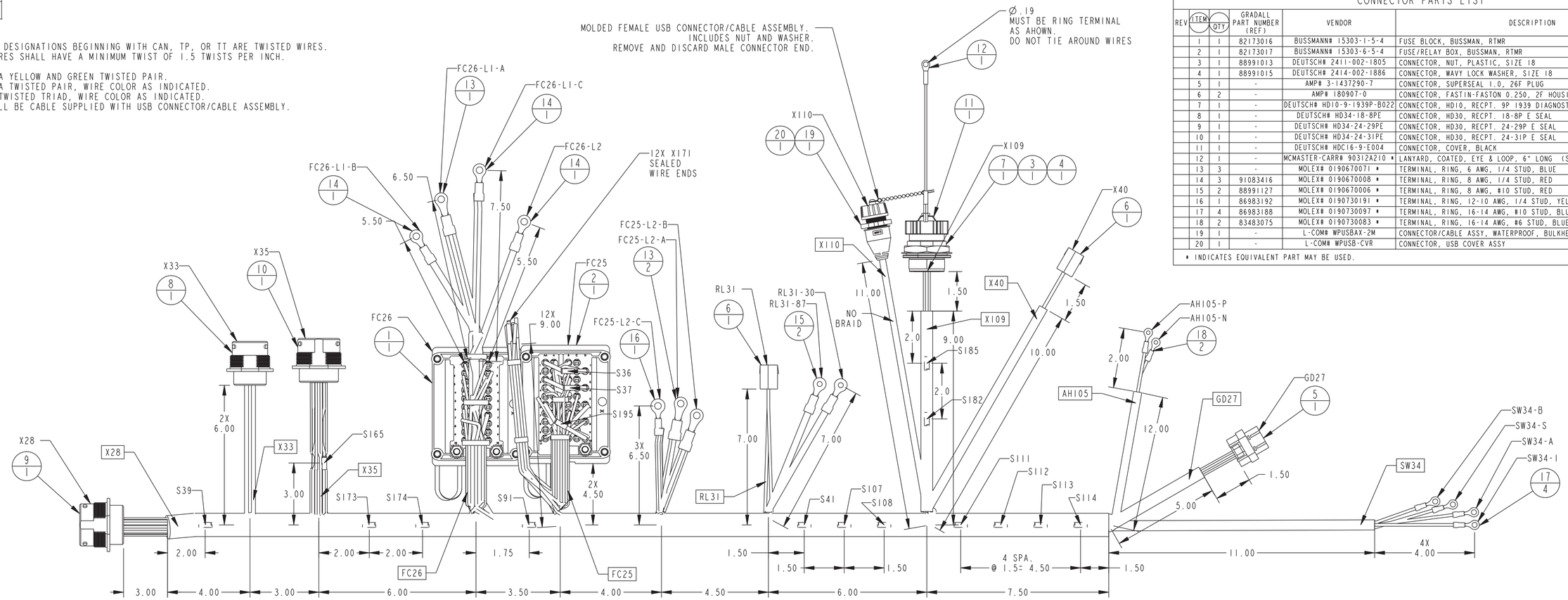
SIZE D | DWG NO. 82173013 | REV B

SCALE: 3/16 | EST WT: 1.4# | SHEET: 1 OF 1

DRAWING NUMBER	REV.
82173012	A

TWISTED WIRES:
ALL WIRES WITH DESIGNATIONS BEGINNING WITH CAN, TP, OR TT ARE TWISTED WIRES.
ALL TWISTED WIRES SHALL HAVE A MINIMUM TWIST OF 1.5 TWISTS PER INCH.

CAN: SHALL BE A YELLOW AND GREEN TWISTED PAIR.
TP: SHALL BE A TWISTED PAIR, WIRE COLOR AS INDICATED.
TT: SHALL BE TWISTED TRIAD, WIRE COLOR AS INDICATED.
USB CABLE: SHALL BE CABLE SUPPLIED WITH USB CONNECTOR/CABLE ASSEMBLY.



SCALE 1/2

CONNECTOR PARTS LIST

REV	ITEM	QTY	GRADALL PART NUMBER (REF)	VENDOR	DESCRIPTION
	1	1	82173016	BUSSMANN# 15303-1-5-4	FUSE BLOCK, BUSSMAN, RTMR
	2	1	82173017	BUSSMANN# 15303-6-5-4	FUSE/RELAY BOX, BUSSMAN, RTMR
	3	1	88991013	DEUTSCH# 2411-002-1805	CONNECTOR, NUT, PLASTIC, SIZE 18
	4	1	88991015	DEUTSCH# 2414-002-1886	CONNECTOR, WAVY LOCK WASHER, SIZE 18
	5	1	-	AMP# 3-1437290-7	CONNECTOR, SUPERSEAL 1.0, 26F PLUG
	6	2	-	AMP# 180907-0	CONNECTOR, FASTIN-FASTON 0.250, 2F HOUSING (TEE)
	7	1	-	DEUTSCH# HD10-9-1939P-B022	CONNECTOR, HD10, RECPT. 9P 1939 DIAGNOSTIC
	8	1	-	DEUTSCH# HD34-18-8PE	CONNECTOR, HD30, RECPT. 18-8P E SEAL
	9	1	-	DEUTSCH# HD34-24-29PE	CONNECTOR, HD30, RECPT. 24-29P E SEAL
	10	1	-	DEUTSCH# HD34-24-31PE	CONNECTOR, HD30, RECPT. 24-31P E SEAL
	11	1	-	DEUTSCH# HDC16-9-E004	CONNECTOR, COVER, BLACK
	12	1	-	MCMASTER-CARR# 90312A210 *	LANYARD, COATED, EYE & LOOP, 6" LONG (SHALL HAVE 3/16 ID EYE)
	13	3	-	MOLEX# 0190670071 *	TERMINAL, RING, 6 AWG, 1/4 STUD, BLUE
	14	3	91083416	MOLEX# 0190670008 *	TERMINAL, RING, 8 AWG, 1/4 STUD, RED
	15	2	88991127	MOLEX# 0190670006 *	TERMINAL, RING, 8 AWG, #10 STUD, RED
	16	1	86983192	MOLEX# 0190730191 *	TERMINAL, RING, 12-10 AWG, 1/4 STUD, YELLOW
	17	4	86983188	MOLEX# 0190730097 *	TERMINAL, RING, 16-14 AWG, #10 STUD, BLUE
	18	2	83483075	MOLEX# 0190730083 *	TERMINAL, RING, 16-14 AWG, #6 STUD, BLUE
	19	1	-	L-COM# WPUSBAX-2M	CONNECTOR/CABLE ASSY, WATERPROOF, BULKHEAD, USB-A
	20	1	-	L-COM# WPUSB-CVR	CONNECTOR, USB COVER ASSY

* INDICATES EQUIVALENT PART MAY BE USED.

TERMINAL TABLE

REF	TERMINAL INDEX #	QTY	VENDOR	TERMINAL: GRADALL PART NUMBER (REF)	TERMINAL: VENDOR PART NUMBER	SEAL: GRADALL PART NUMBER (REF)	SEAL: VENDOR PART NUMBER	DESCRIPTION
	AT010	4	AMP	-	42100-2	-	-	TERMINAL, FASTIN-FASTON, RECPT .250 x .032, TIN, 14-18 AWG
A	AT046	12	AMP	-	3-1447221-4	-	-	TERMINAL, SUPERSEAL, SOCKET 1.0, GOLD, 20-22 AWG
A	AT048	14	AMP	-	4-1437284-3	-	-	TERMINAL, SUPERSEAL, PLUG 1.0
	DT001	4	DEUTSCH	77363346	0460-202-20141	-	-	TERMINAL, SOLID, PIN 20, NICKEL, 20 AWG
A	DT002	24	DEUTSCH	77363228	0460-202-16141	-	-	TERMINAL, SOLID, PIN 16, NICKEL, 16-20 AWG
A	DT003	19	DEUTSCH	80463057	0460-215-16141	-	-	TERMINAL, SOLID, PIN 16, NICKEL, 14 AWG
	DT004	12	DEUTSCH	77363345	0460-204-12141	-	-	TERMINAL, SOLID, PIN 12, NICKEL, 12-14 AWG
	DT013	2	DEUTSCH	88991139	0460-202-2031	-	-	TERMINAL, SOLID, PIN 20, GOLD, 20 AWG
	DT014	6	DEUTSCH	88991140	0460-202-1631	-	-	TERMINAL, SOLID, PIN 16, GOLD, 16-20 AWG
A	DT051	10	DEUTSCH	77363230	114017	-	-	TERMINAL, PLUG 12-16
A	PT021	12	PACKARD	-	-	80963070	12010300	TERMINAL, WEATHER-PACK, METRI-PACK 280, PLUG, GREEN
	PT024	2	PACKARD	-	12110847	-	12041352	TERMINAL, METRI-PACK 280 TANGLESS, FEMALE, TIN, 16-18 AWG, PURPLE SEAL
	PT027	15	PACKARD	-	12129409	80963065	12015284	TERMINAL, METRI-PACK 280 TANGLESS, FEMALE, TIN, 14-16 AWG, GREEN SEAL
	PT028	12	PACKARD	-	12129409	80963066	12015359	TERMINAL, METRI-PACK 280 TANGLESS, FEMALE, TIN, 14-16 AWG, GRAY SEAL
A	PT032	19	PACKARD	-	12110853	80963066	12015359	TERMINAL, METRI-PACK 280 TANGLESS, FEMALE, TIN, 10-12 AWG, GRAY SEAL

NOTES: (UNLESS OTHERWISE SPECIFIED)

1. HARNESS SHALL BE MANUFACTURED TO GRADALL ELECTRICAL SPECIFICATION 77319050 UNLESS OTHERWISE SPECIFIED.
2. ALL WIRES SHALL CONFORM TO SAE J1128, TYPE AS INDICATED.
   12 GAUGE WIRE TO BE TYPE GXL, 19/25 STRANDING.
   14 GAUGE WIRE TO BE TYPE GXL, 19/27 STRANDING.
   16 GAUGE WIRE TO BE TYPE GXL, 19/29 STRANDING.
   18 GAUGE WIRE TO BE TYPE GXL, 16/30 STRANDING.
   20 GAUGE WIRE TO BE TYPE GXL, 7/28 STRANDING.
3. WRAP HARNESS WITH WOVEN NYLON LOOM.
4. TAPE SLITTED CORRUGATED CONDUIT AT ALL ENDS AND EVERY 4" ALONG LENGTH.
5. ALL UNINSULATED TERMINALS SHALL BE COVERED BY INSULATING MATERIAL OR HOUSING.
6. ALL SPLICES SHALL BE ULTRASONICALLY WELDED OR SOLDERED.
7. ALL SPLICED CONNECTIONS SHALL BE WATERTIGHT, INSULATED, AND NO LESS THAN 1" FROM OTHER SPLICES OR BRANCHES.
8. WIRE DESIGNATIONS TO BE VISIBLY HOT-STAMPED ON WIRE ENDS.
9. DESIGNATION LABELS ARE SHOWN IN BOXED NOTES (ARROW SHOWING PLACEMENT OF LABEL). THEY SHOULD BE THE WRAP-AROUND KIND (NOT FLAG STYLE), WITH A PERMANENT WEATHER AND OIL RESISTANT MATERIAL. THIS IS FOR ASSEMBLY AND TROUBLESHOOTING PURPOSES.
10. TERMINAL PART NUMBERS FOR REFERENCE. ALTERNATE PART NUMBERS MAY BE USED BASED ON HARNESS MANUFACTURING PROCESSES.
11. LENGTH TOLERANCES FOR TOTAL BRANCH RUNS:
    UP TO 6.00 _ _ _ _ ±0.50
    6.00 TO 36.00 _ _ _ +1.00/-0.50
    36.00 AND UP _ _ _ _ +2.00/-0.50
12. WIRES NOT IN LOOM SHALL BE ZIP TIED TOGETHER INTO BUNDLES AS SHOWN AND WITH FOLLOWING INSTRUCTIONS:
    -ALL BRANCHES SHALL HAVE A ZIP TIE AT BASE OF BRANCH.
    -NO ZIP TIES WITHIN 3" TO 4" OF A CONNECTOR (UNLESS OTHERWISE SPECIFIED).
    -ZIP TIES SHALL BE PLACED AT A MAXIMUM OF EVER 3" ALONG THEIR LENGTHS.
    -THERE SHALL BE NO BUNDLE OF WIRES LONGER THAT 3" (UNLESS UNDER LOOM OR A SINGLE WIRE) WITHOUT ZIP TIES.
13. HARNESS SHALL BE IDENTIFIED WITH GRADALL PART NUMBER, REVISION, VENDOR PART NUMBER, AND BUILD CODE.
14. ALL CIRCUITS MUST BE ELECTRICALLY TESTED FOR CONTINUITY AND CORRECT POSITION. ALL DIODES TO BE TESTED FOR CORRECT BIASING.

UNLESS OTHERWISE NOTED:
1) THIS IS A PRO ENGINEER / WINDCHILL CONTROLLED DOCUMENT.
2) ALL DIMENSIONS ARE IN INCHES.

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REV	ZONE	DATE	BY	ER NO.	DESCRIPTION	CHKD
A	ALL	24Mar15	EFF	EC150122	REMOVE SP-5 WIRE. ADD TILT SPEED WIRE. WASH-305 WAS WASH-310. ADD CANI TO G27. IGN-306-0 WAS IGN-5-0. IGN-307 WAS ACC-213. BAT-3-3 WAS BAT-209. ADD IGN-7.ADDED S195, S185, S182. CHANGED NOTE 9	AF

REVISIONS

SPECIFICATIONS
1) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2) ALL WELDING TO STRUCTURAL WELD CODE-STEEL ANSI/AWS D1.1
3) ALL DIMENSIONAL TOLERANCES ARE ± .060
4) MACHINE TOLERANCE TO BE ± .015
5) ALL ANGLES ± 1°
6) MACH. SURF. 125 MAX

NEXT ASSY: 82165006

DRAWN BY:	EFF
DATE:	22-Sep-14
CHK'D BY:	AF
DATE:	22-Sep-14
ER NO.:	S03259735-57
CAGE CODE:	
SIMILAR TO:	
FINISH COAT REQ:	N

GRADALL

TITLE: HARNESS, UPPER CAB CONSOLE

MATL: SEE PARTS LIST

SIZE	DWG NO.	REV
D	82173012	A

SCALE: 1/2 | EST WT: 11.0# | SHEET: 1 OF 3

DRAWING NUMBER 82173012

CONNECTOR PIN OUT

REV	CONNECTOR DESIGNATION	CONN POS	TERMINAL INDEX #	WIRE DESIGNATION	WIRE COLOR	STRIPE COLOR	GAUGE	TYPE	TO
	FC25	A1	PT032	AC FAN-301	PNK	BLK	12 AWG	GXL	X33 (H)
	FC25	A10	PT027	IGN-6	YEL	GRN	16 AWG	GXL	SW34-1 (1)
	FC25	A2	PT027	AC PWR-302	PNK	WHT	16 AWG	GXL	X28 (28)
	FC25	A3	PT032	CAB LT-303	BLU	BRN	12 AWG	GXL	X28 (3)
	FC25	A4	PT028	WORK LT-304	BLU	VIO	14 AWG	GXL	X35 (11)
A	FC25	A5	PT027	WASH-305	PNK	YEL	16 AWG	GXL	X35 (12)
A	FC25	A6	PT027	IGN-306-0	YEL	BLU	16 AWG	GXL	S91 (1)
A	FC25	A7	PT028	IGN-307	YEL	BRN	14 AWG	GXL	X35 (7)
	FC25	A8	PT021	PLUG					
	FC25	A9	PT021	PLUG					
	FC25	AA1	PT032	AC-1-1	BRN	GRY	12 AWG	GXL	S36 (1)
	FC25	AA10	PT027	IGN-1-2	YEL	BLK	16 AWG	GXL	S165 ()
	FC25	AA2	PT032	AC-1-2	BRN	GRY	12 AWG	GXL	S36 (1)
	FC25	AA3	PT032	WORK LT-1-1	BLU	GRN	12 AWG	GXL	S37 (1)
	FC25	AA4	PT032	WORK LT-1-2	BLU	GRN	12 AWG	GXL	S37 (1)
	FC25	AA5	PT027	WASH	PNK	RED	16 AWG	GXL	X28 (9)
A	FC25	AA6	PT032	IGN-7-1	YEL	VIO	12 AWG	GXL	S195 (1)
A	FC25	AA7	PT032	IGN-7-2	YEL	VIO	12 AWG	GXL	S195 (1)
	FC25	AA8	PT021	PLUG					
	FC25	AA9	PT021	PLUG					
A	FC25	B1	PT032	BAT-3-2	RED	WHT	12 AWG	GXL	FC26-L1-C ()
	FC25	B10	PT027	IGN-1-1	YEL	BLK	16 AWG	GXL	S165 (2)
	FC25	B2	PT027	AC-0	BRN	GRY	16 AWG	GXL	X35 (17)
A	FC25	B3	PT032	BAT-3-1	RED	WHT	12 AWG	GXL	FC26-L1-C ()
	FC25	B4	PT024	WORK LT-0	BLU	ORG	18 AWG	GXL	X28 (23)
	FC25	B5	PT032	BAT-205	RED	VIO	12 AWG	GXL	FC26 (A5)
	FC25	B6	PT024	BOOM LT-0	BLU	BLK	18 AWG	GXL	X28 (24)
	FC25	B7	PT027	BAT-207-0	RED	LGR	16 AWG	GXL	S39 (1)
	FC25	B8	PT027	HORN-0	BLU	RED	16 AWG	GXL	X28 (12)
A	FC25	B9	PT032	BAT-3-3	RED	WHT	12 AWG	GXL	FC26-L1-C (1)
	FC25	C10	PT021	PLUG					
	FC25	C2	PT021	PLUG					
	FC25	C4	PT021	PLUG					
	FC25	C6	PT021	PLUG					
	FC25	C8	PT021	PLUG					
A	FC25	D10	PT032	IGN-7-0	YEL	VIO	12 AWG	GXL	S195 (2)
	FC25	D2	PT032	AC-1-0	BRN	GRY	12 AWG	GXL	S36 (2)
	FC25	D4	PT032	WORK LT-1-0	BLU	GRN	12 AWG	GXL	S37 (2)
	FC25	D6	PT032	BOOM LT-1	BLU	WHT	12 AWG	GXL	X33 (G)
	FC25	D8	PT027	HORN-1	BLU	YEL	16 AWG	GXL	X35 (10)
	FC25-L2-A	1	RING	GND-7	BLK	-	12 AWG	GXL	X33 (E)
	FC25-L2-A	1	RING	GND-7	BLK	-	12 AWG	GXL	X33 (F)
	FC25-L2-A	1	RING	GND-7	BLK	-	14 AWG	GXL	X40 (2)
	FC25-L2-B	1	RING	GND-10	BLK	-	16 AWG	GXL	RL31 (2)
	FC25-L2-B	1	RING	GND-10	BLK	-	14 AWG	GXL	X28 (17)
	FC25-L2-B	1	RING	GND-10	BLK	-	14 AWG	GXL	X28 (19)
	FC25-L2-B	1	RING	GND-10	BLK	-	14 AWG	GXL	X28 (21)
	FC25-L2-B	1	RING	GND-10	BLK	-	12 AWG	GXL	X28 (4)
	FC25-L2-C	1	RING	GND-11	BLK	-	16 AWG	GXL	AH105-N (1)
	FC25-L2-C	1	RING	GND-11	BLK	-	20 AWG	GXL	GD27 (3)
	FC25-L2-C	1	RING	GND-11	BLK	-	20 AWG	GXL	GD27 (4)
	FC25-L2-C	1	RING	GND-11	BLK	-	16 AWG	GXL	X109 (A)
	FC25-L2-C	1	RING	GND-11	BLK	-	18 AWG	GXL	X28 (18)
	FC26	A1	PT027	BAT-201-0	RED	YEL	16 AWG	GXL	S41 (1)
	FC26	A10	PT028	BAT-210	RED	LBL	14 AWG	GXL	X35 (5)
	FC26	A2	PT028	BAT-202	RED	ORG	14 AWG	GXL	X28 (5)
	FC26	A3	PT027	BAT-203	RED	GRN	16 AWG	GXL	X109 (B)
	FC26	A4	PT028	BAT-204	RED	BLU	14 AWG	GXL	X171-11 (1)
	FC26	A5	PT032	BAT-205	RED	VIO	12 AWG	GXL	FC25 (B5)
	FC26	A6	PT028	BAT-206	RED	BRN	14 AWG	GXL	X171-12 (1)
	FC26	A7	PT027	BAT-207-2	RED	LGR	16 AWG	GXL	S39 (1)
	FC26	A8	PT028	BAT-208	RED	LBL	14 AWG	GXL	X35 (4)
A	FC26	A9	PT021	PLUG					
	FC26	C1	PT028	ACC-211	ORG	BLK	14 AWG	GXL	X28 (6)
	FC26	C10	PT032	ACC-220	ORG	LBL	12 AWG	GXL	X28 (2)
	FC26	C2	PT028	ACC-212	ORG	WHT	14 AWG	GXL	X28 (7)
A	FC26	C3	PT021	PLUG					
	FC26	C4	PT027	ACC-214	ORG	YEL	16 AWG	GXL	X35 (8)
	FC26	C5	PT021	PLUG					
	FC26	C6	PT028	ACC-216-0	ORG	BLU	14 AWG	GXL	S173 (1)
	FC26	C7	PT028	ACC-217-0	ORG	VIO	14 AWG	GXL	S174 (1)
	FC26	C8	PT028	ACC-218	ORG	BRN	14 AWG	GXL	X40 (1)
	FC26	C9	PT032	ACC-219	ORG	LGR	12 AWG	GXL	FC26 (C9)

CONNECTOR PIN OUT

REV	CONNECTOR DESIGNATION	CONN POS	TERMINAL INDEX #	WIRE DESIGNATION	WIRE COLOR	STRIPE COLOR	GAUGE	TYPE	TO
	FC26-L1-A	1	RING	BAT-107	RED	WHT	12 AWG	GXL	X33 (A)
	FC26-L1-A	1	RING	BAT-108	RED	WHT	12 AWG	GXL	X33 (B)
	FC26-L1-A	1	RING	BAT-109	RED	WHT	12 AWG	GXL	X33 (C)
	FC26-L1-A	1	RING	BAT-110	RED	WHT	12 AWG	GXL	X33 (D)
	FC26-L1-B	1	RING	BAT	RED	-	8 AWG	SXL	RL31-30 (1)
	FC26-L1-C	1	RING	BAT-3-2	RED	WHT	12 AWG	GXL	FC25 (B1)
	FC26-L1-C	1	RING	BAT-3-1	RED	WHT	12 AWG	GXL	FC25 (B3)
A	FC26-L1-C	1	RING	BAT-3-3	RED	WHT	12 AWG	GXL	FC25 (B9)
	FC26-L2	1	RING	ACC	ORG	-	8 AWG	SXL	RL31-87 (1)
	GD27	1	AT046	BAT-201-1	RED	YEL	20 AWG	GXL	S41 (2)
A	GD27	2	AT046	IGN-306-2	YEL	BLU	20 AWG	GXL	S91 (1)
	GD27	3	AT046	GND-11	BLK	-	20 AWG	GXL	FC25-L2-C (1)
	GD27	4	AT046	GND-11	BLK	-	20 AWG	GXL	FC25-L2-C (1)
	GD27	5	AT048	PLUG					
	GD27	6	AT048	PLUG					
	GD27	7	AT048	PLUG					
	GD27	8	AT046	CAN2-0-2	YEL	-	20 AWG	GXL	S107 (2)
	GD27	9	AT046	CAN2-0-2	GRN	-	20 AWG	GXL	S108 (2)
A	GD27	10	AT046	CAN1-0-1	YEL	-	20 AWG	GXL	S185 (1)
A	GD27	11	AT046	CAN1-0-1	GRN	-	20 AWG	GXL	S182 (1)
	GD27	12	AT046	USB	RED	-	20 AWG	GXL	S111 (2)
	GD27	13	AT046	USB	BLK	-	20 AWG	GXL	S112 (2)
	GD27	14	AT046	TP-USB	WHT	-	20 AWG	GXL	S113 (2)
	GD27	15	AT046	TP-USB	GRN	-	20 AWG	GXL	S114 (2)
	GD27	16	AT048	PLUG					
	GD27	17	AT048	PLUG					
	GD27	18	AT048	PLUG					
	GD27	19	AT048	PLUG					
	GD27	20	AT048	PLUG					
	GD27	21	AT048	PLUG					
	GD27	22	AT048	PLUG					
	GD27	23	AT048	PLUG					
	GD27	24	AT048	PLUG					
	GD27	25	AT048	PLUG					
	GD27	26	AT048	PLUG					
	X28	1	DT004	ACC-219	ORG	LGR	12 AWG	GXL	FC26 (C9)
	X28	2	DT004	ACC-220	ORG	LBL	12 AWG	GXL	FC26 (C10)
	X28	3	DT004	CAB LT-303	BLU	BRN	12 AWG	GXL	FC25 (A3)
	X28	4	DT004	GND-10	BLK	-	12 AWG	GXL	FC25-L2-B (1)
	X28	5	DT003	BAT-202	RED	ORG	14 AWG	GXL	FC26 (A2)
	X28	6	DT003	ACC-211	ORG	BLK	14 AWG	GXL	FC26 (C1)
	X28	7	DT003	ACC-212	ORG	WHT	14 AWG	GXL	FC26 (C2)
	X28	8	DT003	ACC-216-1	ORG	BLU	14 AWG	GXL	S173 (2)
	X28	9	DT002	WASH	PNK	RED	16 AWG	GXL	FC25 (AA5)
	X28	10	DT003	ACC-217-1	ORG	VIO	14 AWG	GXL	S174 (2)
	X28	11	DT002	BAT-207-1	RED	LGR	16 AWG	GXL	S39 (2)
	X28	12	DT002	HORN-0	BLU	RED	16 AWG	GXL	FC25 (B8)
	X28	13	DT002	FAN C	VIO	BRN	16 AWG	GXL	X35 (13)
	X28	14	DT002	PILOT SW	VIO	WHT	16 AWG	GXL	X35 (14)
A	X28	15	DT002	TILT SPEED	WHT	GRN	18 AWG	GXL	X35 (22)
	X28	16	DT002	AC CLUTCH-1	PNK	ORG	16 AWG	GXL	X35 (16)
	X28	17	DT003	GND-10	BLK	-	14 AWG	GXL	FC25-L2-B (1)
	X28	18	DT001	GND-11	BLK	-	18 AWG	GXL	FC25-L2-C (1)
	X28	19	DT003	GND-10	BLK	-	14 AWG	GXL	FC25-L2-B (1)
A	X28	20	DT001	IGN-306-1	YEL	BLU	18 AWG	GXL	S91 (2)
	X28	21	DT003	GND-10	BLK	-	14 AWG	GXL	FC25-L2-B (1)
	X28	22	DT003	SP-6	GRY	GRN	14 AWG	GXL	X171-6 (1)
	X28	23	DT001	WORK LT-0	BLU	ORG	18 AWG	GXL	FC25 (B4)
	X28	24	DT001	BOOM LT-0	BLU	BLK	18 AWG	GXL	FC25 (B6)
	X28	25	DT003	SP-7	GRY	BLU	14 AWG	GXL	X171-7 (1)
	X28	26	DT003	SP-8	GRY	VIO	14 AWG	GXL	X171-8 (1)
	X28	27	DT013	CAN2-0-1	YEL	-	18 AWG	GXL	S107 (1)
	X28	28	DT002	AC PWR-302	PNK	WHT	16 AWG	GXL	FC25 (A2)
	X28	29	DT013	CAN2-0-1	GRN	-	18 AWG	GXL	S108 (1)
	RL31	1	AT010	ACC-0	ORG	-	16 AWG	GXL	SW34-A (1)
	RL31	2	AT010	GND-10	BLK	-	16 AWG	GXL	FC25-L2-B (1)
	RL31-30	1	RING	BAT	RED	-	8 AWG	SXL	FC26-L1-B (1)
	RL31-87	1	RING	ACC	ORG	-	8 AWG	SXL	FC26-L2 (1)
	X33	A	DT004	BAT-107	RED	WHT	12 AWG	GXL	FC26-L1-A (1)
	X33	B	DT004	BAT-108	RED	WHT	12 AWG	GXL	FC26-L1-A (1)
	X33	C	DT004	BAT-109	RED	WHT	12 AWG	GXL	FC26-L1-A (1)
	X33	D	DT004	BAT-110	RED	WHT	12 AWG	GXL	FC26-L1-A (1)
	X33	E	DT004	GND-7	BLK	-	12 AWG	GXL	FC25-L2-A (1)
	X33	F	DT004	GND-7	BLK	-	12 AWG	GXL	FC25-L2-A (1)
	X33	G	DT004	BOOM LT-1	BLU	WHT	12 AWG	GXL	FC25 (D6)

CONNECTOR PIN OUT

REV	CONNECTOR DESIGNATION	CONN POS	TERMINAL INDEX #	WIRE DESIGNATION	WIRE COLOR	STRIPE COLOR	GAUGE	TYPE	TO
	X33	H	DT004	AC FAN-301	PNK	BLK	12 AWG	GXL	FC25 (A1)
	SW34-A	1	RING	ACC-0	ORG	-	16 AWG	GXL	RL31 (1)
	SW34-B	1	RING	UP BAT	RED	BLK	16 AWG	GXL	X35 (1)
	SW34-1	1	RING	IGN-6	YEL	GRN	16 AWG	GXL	FC25 (A10)
	SW34-S	1	RING	UP START SW	VIO	BLK	16 AWG	GXL	X35 (9)
	X35	1	DT002	UP BAT	RED	BLK	16 AWG	GXL	SW34-B (1)
	X35	2	DT002	IGN-1-0	YEL	BLK	16 AWG	GXL	S165 (1)
	X35	3	DT002	BAT-201-2	RED	YEL	16 AWG	GXL	S41 (1)
	X35	4	DT003	BAT-208	RED	LBL	14 AWG	GXL	FC26 (A8)
	X35	5	DT003	BAT-210	RED	LBL	14 AWG	GXL	FC26 (A10)
A	X35	6	DT002	IGN-306-3	YEL	BLU	16 AWG	GXL	S91 (2)
A	X35	7	DT003	IGN-307	YEL	BRN	14 AWG	GXL	FC25 (A7)
	X35	8	DT002	ACC-214	ORG	YEL	16 AWG	GXL	FC26 (C4)
	X35	9	DT002	UP START SW	VIO	BLK	16 AWG	GXL	SW34-S (1)
	X35	10	DT002	HORN-1	BLU	YEL	16 AWG	GXL	FC25 (D8)
	X35	11	DT003	WORK LT-304	BLU	VIO	14 AWG	GXL	FC25 (A4)
A	X35	12	DT002	WASH-305	PNK	YEL	16 AWG	GXL	FC25 (A5)
	X35	13	DT002	FAN C	VIO	BRN	16 AWG	GXL	X28 (13)
	X35	14	DT002	PILOT SW	VIO	WHT	16 AWG	GXL	X28 (14)
	X35	15	DT002	CAB ALM	BRN	-	16 AWG	GXL	AH105-P (1)
	X35	16	DT002	AC CLUTCH-1	PNK	ORG	16 AWG	GXL	X28 (16)
	X35	17	DT002	AC-0	BRN	GRY	16 AWG	GXL	FC25 (B2)
	X35	18	DT003	SP-1	GRY	BLK	14 AWG	GXL	X171-1 (1)
	X35	19	DT003	SP-2	GRY	WHT	14 AWG	GXL	X171-2 (1)
	X35	20	DT003	SP-3	GRY	RED	14 AWG	GXL	X171-3 (1)
	X35	21	DT002	TILT SPEED	WHT	GRN	18 AWG	GXL	X28 (15)
	X35	22	DT003	SP-4	GRY	YEL	14 AWG	GXL	X171-4 (1)
	X35	23	DT051	PLUG					
	X35	24	DT051	PLUG					
	X35	25	DT051	PLUG					
A	X35	26	DT014	CAN1-0-0	YEL	-	18 AWG	GXL	S185 (1)
A	X35	27	DT014	CAN1-0-0	GRN	-	18 AWG	GXL	S182 (1)
	X35	28	DT014	CAN2-0-0	YEL	-	18 AWG	GXL	S107 (1)
	X35	29	DT014	CAN2-0-0	GRN	-	18 AWG	GXL	S108 (1)
	X35	30	DT051	PLUG					
	X35	31	DT051	PLUG					
	S36	1	SPLICE	AC-1-1	BRN	GRY	12 AWG	GXL	FC25 (AA1)
	S36	1	SPLICE	AC-1-2	BRN	GRY	12 AWG	GXL	FC25 (AA2)
	S36	2	SPLICE	AC-1-0	BRN	GRY	12 AWG	GXL	FC25 (D2)
	S37	1	SPLICE	WORK LT-1-1	BLU	GRN	12 AWG	GXL	FC25 (AA3)
	S37	1	SPLICE	WORK LT-1-2	BLU	GRN	12 AWG	GXL	FC25 (AA4)
	S37	2	SPLICE	WORK LT-1-0	BLU	GRN	12 AWG	GXL	FC25 (D4)
	S39	1	SPLICE	BAT-207-0	RED	LGR	16 AWG	GXL	FC25 (B7)
	S39	1	SPLICE	BAT-207-2	RED	LGR	16 AWG	GXL	FC26 (A7)
	S39	2	SPLICE	BAT-207-1	RED	LGR	16 AWG	GXL	X28 (11)
	X40	1	AT010	ACC-218	ORG	BRN	14 AWG	GXL	FC26 (C8)
	X40	2	AT010	GND-7	BLK	-	14 AWG	GXL	FC25-L2-A (1)
	S41	1	SPLICE	BAT-201-0	RED	YEL	16 AWG	GXL	FC26 (A1)
	S41	1	SPLICE	BAT-201-2	RED	YEL	16 AWG	GXL	X35 (3)
	S41	2	SPLICE	BAT-201-1	RED	YEL	20 AWG	GXL	GD27 (1)
A	S91	1	SPLICE	IGN-306-0	YEL	BLU	16 AWG	GXL	FC25 (A6)
A	S91	1	SPLICE	IGN-306-2	YEL	BLU	20 AWG	GXL	GD27 (2)
A	S91	2	SPLICE	IGN-306-1	YEL	BLU	18 AWG	GXL	X28 (20)
A	S91	2	SPLICE	IGN-306-3	YEL	BLU	16 AWG	GXL	X35 (6)
	AH105-N	1	RING	GND-11	BLK	-	16 AWG	GXL	FC25-L2-C (1)
	AH105-P	1	RING	CAB ALM	BRN	-	16 AWG	GXL	X35 (15)
	S107	1	SPLICE	CAN2-0-1	YEL	-	18 AWG	GXL	X28 (27)
	S107	1	SPLICE	CAN2-0-0	YEL	-	18 AWG	GXL	X35 (28)
	S107	2	SPLICE	CAN2-0-2	YEL	-	20 AWG	GXL	GD27 (8)
	S108	1	SPLICE	CAN2-0-1	GRN	-	18 AWG	GXL	X28 (29)
	S108	1	SPLICE	CAN2-0-0	GRN	-	18 AWG	GXL	X35 (29)
	S108	2	SPLICE	CAN2-0-2	GRN	-	20 AWG	GXL	GD27 (9)
	X109	A	DT002	GND-11	BLK	-	16 AWG	GXL	FC25-L2-C (1)
	X109	B	DT002	BAT-203	RED	GRN	16 AWG	GXL	FC26 (A3)
A	X109	C	DT014	CAN1-0-2	YEL	-	18 AWG	GXL	S185 (2)
A	X109	D	DT014	CAN1-0-2	GRN	-	18 AWG	GXL	S182 (2)
	X109	E	DT051	PLUG					
	X109	F	DT051	PLUG					
	X109	G	DT051	PLUG					
	X109	H	DT051	PLUG					

CONNECTOR PIN OUT

REV	CONNECTOR DESIGNATION	CONN POS	TERMINAL INDEX #	WIRE DESIGNATION	WIRE COLOR	STRIPE COLOR	GAUGE	TYPE	TO
	X109	J	DT051	PLUG					
	X110	1	N/A	USB	RED	-	24 AWG		S111 (1)
	X110	2	N/A	USB	WHT	-	28 AWG		S113 (1)
	X110	3	N/A	USB	GRN	-	28 AWG		S114 (1)
	X110	4	N/A	USB	BLK	-	24 AWG		S112 (1)
	S111	1	SPLICE	USB	RED	-	24 AWG		X110 (1)
	S111	2	SPLICE	USB	RED	-	20 AWG	GXL	GD27 (12)
	S112	1	SPLICE	USB	BLK	-	24 AWG		X110 (4)
	S112	2	SPLICE	USB	BLK	-	20 AWG	GXL	GD27 (13)
	S113	1	SPLICE	USB	WHT	-	28 AWG		X110 (2)
	S113	2	SPLICE	TP-USB	WHT	-	20 AWG	GXL	GD27 (14)
	S114	1	SPLICE	USB	GRN	-	28 AWG		X110 (3)
	S114	2	SPLICE	TP-USB	GRN	-	20 AWG	GXL	GD27 (15)
	S165	1	SPLICE	IGN-1-0	YEL	BLK	16 AWG	GXL	X35 (2)
	S165	2	SPLICE	IGN-1-2	YEL	BLK	16 AWG	GXL	FC25 (AA10)
	S165	2	SPLICE	IGN-1-1	YEL	BLK	16 AWG	GXL	FC25 (B10)
	X171-1	1	SHRINK	SP-1	GRY	BLK	14 AWG	GXL	X35 (18)
	X171-2	1	SHRINK	SP-2	GRY	WHT	14 AWG	GXL	X35 (19)
	X171-3	1	SHRINK	SP-3	GRY	RED	14 AWG	GXL	X35 (20)
	X171-4	1	SHRINK	SP-4	GRY	YEL	14 AWG	GXL	X35 (21)
	X171-6	1	SHRINK	SP-6	GRY	GRN	14 AWG	GXL	X28 (22)
	X171-7	1	SHRINK	SP-7	GRY	BLU	14 AWG	GXL	X28 (25)
	X171-8	1	SHRINK	SP-8	GRY	VIO	14 AWG	GXL	X28 (26)
	X171-9	1	SHRINK	ACC-216-2	ORG	BLU	14 AWG	GXL	S173 (1)
	X171-10	1	SHRINK	ACC-217-2	ORG	VIO	14 AWG	GXL	S174 (1)
	X171-11	1	SHRINK	BAT-204	RED	BLU	14 AWG	GXL	FC26 (A4)
	X171-12	1	SHRINK	BAT-206	RED	BRN	14 AWG	GXL	FC26 (A6)
	S173	1	SPLICE	ACC-216-0	ORG	BLU	14 AWG	GXL	FC26 (C6)
	S173	1	SPLICE	ACC-216-2	ORG	BLU	14 AWG	GXL	X171-9 (1)
	S173	2	SPLICE	ACC-216-1	ORG	BLU	14 AWG	GXL	X28 (8)
	S174	1	SPLICE	ACC-217-0	ORG	VIO	14 AWG	GXL	FC26 (C7)
	S174	1	SPLICE	ACC-217-2	ORG	VIO	14 AWG	GXL	X171-10 (1)
	S174	2	SPLICE	ACC-217-1	ORG	VIO	14 AWG	GXL	X28 (10)
A	S182	1	SPLICE	CAN1-0-1	GRN	-	20 AWG	GXL	GD27 (11)
A	S182	1	SPLICE	CAN1-0-0	GRN	-	18 AWG	GXL	X35 (27)
A	S182	2	SPLICE	CAN1-0-2	GRN	-	18 AWG	GXL	X109 (D)
A	S185	1	SPLICE	CAN1-0-1	YEL	-	20 AWG	GXL	GD27 (10)
A	S185	1	SPLICE	CAN1-0-0	YEL	-	18 AWG	GXL	X35 (26)
A	S185	2	SPLICE	CAN1-0-2	YEL	-	18 AWG	GXL	X109 (C)
A	S195	1	SPLICE	IGN-7-1	YEL	VIO	12 AWG	GXL	FC25 (AA6)
A	S195	1	SPLICE	IGN-7-2	YEL	VIO	12 AWG	GXL	FC25 (AA7)
A	S195	2	SPLICE	IGN-7-0	YEL	VIO	12 AWG	GXL	FC25 (D10)

UNLESS OTHERWISE NOTED:
1) THIS IS A PRO ENGINEER / WINDCHILL CONTROLLED DOCUMENT.
2) ALL DIMENSIONS ARE IN INCHES.

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REV	ZONE	DATE	BY	ER NO.	DESCRIPTION	CHKD
A	ALL	24Mar15	EFF	EC150122	UPDATED REVISED ITEMS ON TABLES	AF

REVISIONS

SPECIFICATIONS
1) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2) ALL WELDING TO STRUCTURAL WELD CODE-STEEL ANSI/AWS D1.1
3) ALL DIMENSIONAL TOLERANCES ARE ± .060
4) MACHINE TOLERANCE TO BE ± .015
5) ALL ANGLES ± 1°
6) MACH. SURF. 125 MAX

NEXT ASSY 82165006

DRAWN BY:	EFF
DATE:	22-Sep-14
CHK'D BY:	AF
DATE:	22-Sep-14
ER NO.:	S03259735-57
CAGE CODE:	
SIMILAR TO:	
FINISH COAT REQ:	N

GRADALL

TITLE: HARNESS, UPPER CAB CONSOLE

MATL: SEE PARTS LIST

SIZE D | DWG NO. 82173012 | REV A

SCALE: 1/4 | EST WT: 11.0# | SHEET: 2 OF 3

DRAWING NUMBER
82173012

FROM-TO WIRE LIST

REV	WIRE NAME (REF ONLY)	WIRE DESIGNATION	FROM			TO			WIRE COLOR	STRIPE COLOR	GAUGE	TYPE
			CONNECTOR	PIN	TERM INDEX #	CONNECTOR	PIN	TERM INDEX #				
	AC CLUTCH-1_(2)	AC CLUTCH-1	X28	16	DT002	X35	16	DT002	PNK	ORG	16 AWG	GXL
	AC FAN-301_(1)	AC FAN-301	FC25	A1	PT032	X33	H	DT004	PNK	BLK	12 AWG	GXL
	AC PWR-302_(1)	AC PWR-302	FC25	A2	PT027	X28	28	DT002	PNK	WHT	16 AWG	GXL
	AC-0_(1)	AC-0	FC25	B2	PT027	X35	17	DT002	BRN	GRY	16 AWG	GXL
	AC-1-0_(1)	AC-1-0	FC25	D2	PT032	S36	2	SPLICE	BRN	GRY	12 AWG	GXL
	AC-1-1_(1)	AC-1-1	FC25	AA1	PT032	S36	1	SPLICE	BRN	GRY	12 AWG	GXL
	AC-1-2_(1)	AC-1-2	FC25	AA2	PT032	S36	1	SPLICE	BRN	GRY	12 AWG	GXL
	ACC-0_(1)	ACC-0	SW34-A	1	RING	RL31	1	AT010	ORG	-	16 AWG	GXL
	ACC-211_(1)	ACC-211	FC26	C1	PT028	X28	6	DT003	ORG	BLK	14 AWG	GXL
	ACC-212_(1)	ACC-212	FC26	C2	PT028	X28	7	DT003	ORG	WHT	14 AWG	GXL
	ACC-214_(1)	ACC-214	X35	8	DT002	FC26	C4	PT027	ORG	YEL	16 AWG	GXL
	ACC-216-0_(1)	ACC-216-0	FC26	C6	PT028	S173	1	SPLICE	ORG	BLU	14 AWG	GXL
	ACC-216-1_(1)	ACC-216-1	X28	8	DT003	S173	2	SPLICE	ORG	BLU	14 AWG	GXL
	ACC-216-2_(1)	ACC-216-2	X171-9	1	SHRINK	S173	1	SPLICE	ORG	BLU	14 AWG	GXL
	ACC-217-0_(1)	ACC-217-0	FC26	C7	PT028	S174	1	SPLICE	ORG	VIO	14 AWG	GXL
	ACC-217-1_(1)	ACC-217-1	X28	10	DT003	S174	2	SPLICE	ORG	VIO	14 AWG	GXL
	ACC-217-2_(1)	ACC-217-2	X171-10	1	SHRINK	S174	1	SPLICE	ORG	VIO	14 AWG	GXL
	ACC-218_(1)	ACC-218	X40	1	AT010	FC26	C8	PT028	ORG	BRN	14 AWG	GXL
	ACC-219_(1)	ACC-219	FC26	C9	PT032	X28	1	DT004	ORG	LGR	12 AWG	GXL
	ACC-220_(1)	ACC-220	FC26	C10	PT032	X28	2	DT004	ORG	LBL	12 AWG	GXL
	ACC_(1)	ACC	RL31-87	1	RING	FC26-L2	1	RING	ORG	-	8 AWG	SXL
	BAT-3-1_(1)	BAT-3-1	FC25	B3	PT032	FC26-L1-C	1	RING	RED	WHT	12 AWG	GXL
	BAT-3-2_(1)	BAT-3-2	FC25	B1	PT032	FC26-L1-C	1	RING	RED	WHT	12 AWG	GXL
A	BAT-3-3_(1)	BAT-3-3	FC26-L1-C	1	RING	FC25	B9	PT032	RED	WHT	12 AWG	GXL
A	BAT-107_(4)	BAT-107	X33	A	DT004	FC26-L1-A	1	RING	RED	WHT	12 AWG	GXL
	BAT-108_(4)	BAT-108	X33	B	DT004	FC26-L1-A	1	RING	RED	WHT	12 AWG	GXL
	BAT-109_(4)	BAT-109	X33	C	DT004	FC26-L1-A	1	RING	RED	WHT	12 AWG	GXL
	BAT-110_(4)	BAT-110	X33	D	DT004	FC26-L1-A	1	RING	RED	WHT	12 AWG	GXL
	BAT-201-0_(1)	BAT-201-0	FC26	A1	PT027	S41	1	SPLICE	RED	YEL	16 AWG	GXL
	BAT-201-1_(1)	BAT-201-1	GD27	1	AT046	S41	2	SPLICE	RED	YEL	20 AWG	GXL
	BAT-201-2_(1)	BAT-201-2	X35	3	DT002	S41	1	SPLICE	RED	YEL	16 AWG	GXL
	BAT-202_(1)	BAT-202	FC26	A2	PT028	X28	5	DT003	RED	ORG	14 AWG	GXL
	BAT-203_(1)	BAT-203	FC26	A3	PT027	X109	B	DT002	RED	GRN	16 AWG	GXL
	BAT-204_(1)	BAT-204	FC26	A4	PT028	X171-11	1	SHRINK	RED	BLU	14 AWG	GXL
	BAT-205_(1)	BAT-205	FC26	A5	PT032	FC25	B5	PT032	RED	VIO	12 AWG	GXL
	BAT-206_(1)	BAT-206	FC26	A6	PT028	X171-12	1	SHRINK	RED	BRN	14 AWG	GXL
	BAT-207-0_(1)	BAT-207-0	FC25	B7	PT027	S39	1	SPLICE	RED	LGR	16 AWG	GXL
	BAT-207-1_(1)	BAT-207-1	X28	11	DT002	S39	2	SPLICE	RED	LGR	16 AWG	GXL
	BAT-207-2_(1)	BAT-207-2	FC26	A7	PT027	S39	1	SPLICE	RED	LGR	16 AWG	GXL
	BAT-208_(1)	BAT-208	FC26	A8	PT028	X35	4	DT003	RED	LBL	14 AWG	GXL
	BAT-210_(1)	BAT-210	FC26	A10	PT028	X35	5	DT003	RED	LBL	14 AWG	GXL
	BAT_(20)	BAT	FC26-L1-B	1	RING	RL31-30	1	RING	RED	-	8 AWG	SXL
	BOOM LT-0_(1)	BOOM LT-0	X28	24	DT001	FC25	B6	PT024	BLU	BLK	18 AWG	GXL
	BOOM LT-1_(1)	BOOM LT-1	FC25	D6	PT032	X33	G	DT004	BLU	WHT	12 AWG	GXL
	CAB ALM_(2)	CAB ALM	X35	15	DT002	AH105-P	1	RING	BRN	-	16 AWG	GXL
	CAB LT-303_(1)	CAB LT-303	FC25	A3	PT032	X28	3	DT004	BLU	BRN	12 AWG	GXL
A	CAN1-0-0_(5)	CAN1-0-0	X35	27	DT014	S182	1	SPLICE	GRN	-	18 AWG	GXL
A	CAN1-0-0_(6)	CAN1-0-0	X35	26	DT014	S185	1	SPLICE	YEL	-	18 AWG	GXL
A	CAN1-0-1_(5)	CAN1-0-1	GD27	11	AT046	S182	1	SPLICE	GRN	-	20 AWG	GXL
A	CAN1-0-1_(6)	CAN1-0-1	GD27	10	AT046	S185	1	SPLICE	YEL	-	20 AWG	GXL
A	CAN1-0-2_(5)	CAN1-0-2	X109	D	DT014	S182	2	SPLICE	GRN	-	18 AWG	GXL
A	CAN1-0-2_(6)	CAN1-0-2	X109	C	DT014	S185	2	SPLICE	YEL	-	18 AWG	GXL
	CAN2-0-0_(1)	CAN2-0-0	X35	28	DT014	S107	1	SPLICE	YEL	-	18 AWG	GXL
	CAN2-0-0_(2)	CAN2-0-0	X35	29	DT014	S108	1	SPLICE	GRN	-	18 AWG	GXL
	CAN2-0-1_(1)	CAN2-0-1	X28	29	DT013	S108	1	SPLICE	GRN	-	18 AWG	GXL
	CAN2-0-1_(2)	CAN2-0-1	X28	27	DT013	S107	1	SPLICE	YEL	-	18 AWG	GXL
	CAN2-0-2_(1)	CAN2-0-2	GD27	8	AT046	S107	2	SPLICE	YEL	-	20 AWG	GXL
	CAN2-0-2_(2)	CAN2-0-2	GD27	9	AT046	S108	2	SPLICE	GRN	-	20 AWG	GXL
	FAN C_(1)	FAN C	X28	13	DT002	X35	13	DT002	VIO	BRN	16 AWG	GXL

FROM-TO WIRE LIST

REV	WIRE NAME (REF ONLY)	WIRE DESIGNATION	FROM			TO			WIRE COLOR	STRIPE COLOR	GAUGE	TYPE
			CONNECTOR	PIN	TERM INDEX #	CONNECTOR	PIN	TERM INDEX #				
	GND-7_(3)	GND-7	X33	E	DT004	FC25-L2-A	1	RING	BLK	-	12 AWG	GXL
	GND-7_(4)	GND-7	X33	F	DT004	FC25-L2-A	1	RING	BLK	-	12 AWG	GXL
	GND-7_(5)	GND-7	X40	2	AT010	FC25-L2-A	1	RING	BLK	-	14 AWG	GXL
	GND-10_(1)	GND-10	FC25-L2-B	1	RING	X28	4	DT004	BLK	-	12 AWG	GXL
	GND-10_(2)	GND-10	X28	17	DT003	FC25-L2-B	1	RING	BLK	-	14 AWG	GXL
	GND-10_(3)	GND-10	X28	19	DT003	FC25-L2-B	1	RING	BLK	-	14 AWG	GXL
	GND-10_(4)	GND-10	X28	21	DT003	FC25-L2-B	1	RING	BLK	-	14 AWG	GXL
	GND-10_(5)	GND-10	RL31	2	AT010	FC25-L2-B	1	RING	BLK	-	16 AWG	GXL
	GND-11_(1)	GND-11	X28	18	DT001	FC25-L2-C	1	RING	BLK	-	18 AWG	GXL
	GND-11_(2)	GND-11	GD27	3	AT046	FC25-L2-C	1	RING	BLK	-	20 AWG	GXL
	GND-11_(3)	GND-11	GD27	4	AT046	FC25-L2-C	1	RING	BLK	-	20 AWG	GXL
	GND-11_(4)	GND-11	AH105-N	1	RING	FC25-L2-C	1	RING	BLK	-	16 AWG	GXL
	GND-11_(5)	GND-11	X109	A	DT002	FC25-L2-C	1	RING	BLK	-	16 AWG	GXL
	HORN-0_(1)	HORN-0	X28	12	DT002	FC25	B8	PT027	BLU	RED	16 AWG	GXL
	HORN-1_(1)	HORN-1	FC25	D8	PT027	X35	10	DT002	BLU	YEL	16 AWG	GXL
	IGN-1-0_(1)	IGN-1-0	X35	2	DT002	S165	1	SPLICE	YEL	BLK	16 AWG	GXL
	IGN-1-1_(1)	IGN-1-1	FC25	B10	PT027	S165	2	SPLICE	YEL	BLK	16 AWG	GXL
	IGN-1-2_(2)	IGN-1-2	FC25	AA10	PT027	S165	2	SPLICE	YEL	BLK	16 AWG	GXL
	IGN-6_(1)	IGN-6	SW34-1	1	RING	FC25	A10	PT027	YEL	GRN	16 AWG	GXL
A	IGN-7-0_(1)	IGN-7-0	FC25	D10	PT032	S195	2	SPLICE	YEL	VIO	12 AWG	GXL
A	IGN-7-1_(1)	IGN-7-1	FC25	AA6	PT032	S195	1	SPLICE	YEL	VIO	12 AWG	GXL
A	IGN-7-2_(1)	IGN-7-2	FC25	AA7	PT032	S195	1	SPLICE	YEL	VIO	12 AWG	GXL
A	IGN-306-0_(1)	IGN-306-0	FC25	A6	PT027	S91	1	SPLICE	YEL	BLU	16 AWG	GXL
A	IGN-306-1_(1)	IGN-306-1	X28	20	DT001	S91	2	SPLICE	YEL	BLU	18 AWG	GXL
A	IGN-306-2_(1)	IGN-306-2	GD27	2	AT046	S91	1	SPLICE	YEL	BLU	20 AWG	GXL
A	IGN-306-3_(1)	IGN-306-3	X35	6	DT002	S91	2	SPLICE	YEL	BLU	16 AWG	GXL
A	IGN-307_(1)	IGN-307	FC25	A7	PT028	X35	7	DT003	YEL	BRN	14 AWG	GXL
	PILOT SW_(2)	PILOT SW	X28	14	DT002	X35	14	DT002	VIO	WHT	16 AWG	GXL
	SP-1_(1)	SP-1	X171-1	1	SHRINK	X35	18	DT003	GRY	BLK	14 AWG	GXL
	SP-2_(1)	SP-2	X171-2	1	SHRINK	X35	19	DT003	GRY	WHT	14 AWG	GXL
	SP-3_(1)	SP-3	X171-3	1	SHRINK	X35	20	DT003	GRY	RED	14 AWG	GXL
	SP-4_(1)	SP-4	X171-4	1	SHRINK	X35	22	DT003	GRY	YEL	14 AWG	GXL
	SP-6_(4)	SP-6	X28	22	DT003	X171-6	1	SHRINK	GRY	GRN	14 AWG	GXL
	SP-7_(5)	SP-7	X28	25	DT003	X171-7	1	SHRINK	GRY	BLU	14 AWG	GXL
	SP-8_(5)	SP-8	X28	26	DT003	X171-8	1	SHRINK	GRY	VIO	14 AWG	GXL
A	TILT SPEED_(2)	TILT SPEED	X28	15	DT002	X35	21	DT002	WHT	GRN	18 AWG	GXL
	TP-USB_(1)	TP-USB	GD27	14	AT046	S113	2	SPLICE	WHT	-	20 AWG	GXL
	TP-USB_(2)	TP-USB	GD27	15	AT046	S114	2	SPLICE	GRN	-	20 AWG	GXL
	UP BAT_(3)	UP BAT	X35	1	DT002	SW34-B	1	RING	RED	BLK	16 AWG	GXL
	UP START SW_(1)	UP START SW	SW34-S	1	RING	X35	9	DT002	VIO	BLK	16 AWG	GXL
	USB_(1)	USB	GD27	12	AT046	S111	2	SPLICE	RED	-	20 AWG	GXL
	USB_(4)	USB	GD27	13	AT046	S112	2	SPLICE	BLK	-	20 AWG	GXL
	USB_(5)	USB	X110	1	N/A	S111	1	SPLICE	RED	-	24 AWG	-
	USB_(6)	USB	X110	4	N/A	S112	1	SPLICE	BLK	-	24 AWG	-
	USB_(7)	USB	X110	2	N/A	S113	1	SPLICE	WHT	-	28 AWG	-
	USB_(8)	USB	X110	3	N/A	S114	1	SPLICE	GRN	-	28 AWG	-
A	WASH-305_(1)	WASH-305	FC25	A5	PT027	X35	12	DT002	PNK	YEL	16 AWG	GXL
	WASH_(2)	WASH	X28	9	DT002	FC25	AA5	PT027	PNK	RED	16 AWG	GXL
	WORK LT-0_(1)	WORK LT-0	X28	23	DT001	FC25	B4	PT024	BLU	ORG	18 AWG	GXL
	WORK LT-1-0_(1)	WORK LT-1-0	FC25	D4	PT032	S37	2	SPLICE	BLU	GRN	12 AWG	GXL
	WORK LT-1-1_(1)	WORK LT-1-1	FC25	AA3	PT032	S37	1	SPLICE	BLU	GRN	12 AWG	GXL
	WORK LT-1-2_(1)	WORK LT-1-2	FC25	AA4	PT032	S37	1	SPLICE	BLU	GRN	12 AWG	GXL
	WORK LT-304_(1)	WORK LT-304	FC25	A4	PT028	X35	11	DT003	BLU	VIO	14 AWG	GXL

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1) THIS IS A PRO ENGINEER / WINDCHILL CONTROLLED DOCUMENT.
2) ALL DIMENSIONS ARE IN INCHES.

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REV	ZONE	DATE	BY	ER NO.	DESCRIPTION	CHKD
A	ALL	24Mar15	EFF	EC150122	UPDATED REVISED ITEMS ON TABLES	AF

REVISIONS

SPECIFICATIONS
1) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2) ALL WELDING TO STRUCTURAL WELD CODE-STEEL ANSI/AWS D1.1
3) ALL DIMENSIONAL TOLERANCES ARE ± .060
4) MACHINE TOLERANCE TO BE ± .015
5) ALL ANGLES ± 1°
6) MACH. SURF. 125 MAX

NEXT ASSY 82165006

DRAWN BY:	EFF
DATE:	22-Sep-14
CHK'D BY:	AF
DATE:	22-Sep-14
ER NO.:	S03259735-57
CAGE CODE:	
SIMILAR TO:	
FINISH COAT REQ:	N

GRADALL

TITLE: HARNESS, UPPER CAB CONSOLE

MATL: SEE PARTS LIST

SIZE D | DWG NO. 82173012 | REV A

SCALE: 1/4 | EST WT: 11.0# | SHEET: 3 OF 3

DRAWING NUMBER 82109001 | REV. A

DRAWING NUMBER 82109001

HTR/AC MANIFOLD
80733127

LS1
LS
HTR
AC
0.8mm
0-5.0 GPM
3500 PSI
G2
G1
MP
T
T2

A/C COMPRESSOR MOTOR
80533037

1050 PSI
80533014

HEATER
PUMP/MOTOR
ASSEMBLY
80533022

TEMP SENSOR
4000012

HEATER
RESERVOIR
80383263

BOOM
82105005
3.25" x 2.25" x 123"

HOIST
HOIST
82105000
3.25" x 2.25" x 28.5"

TOOL
82105003
4.50" x 2.50" x 18.875"

SWING MOTOR
82133002
28 CC/REV

TILT DRIVE ASSY
82123018

1000 PSI
3:1 RATIO

95 lpm
105 lpm
45 lpm
85 lpm
60 lpm
80 lpm
80 lpm
80 lpm
30 lpm
30 lpm

P
PP
L
LS
PG
A1
B1
A2
B2
A3
B3
A4
B4
A5
B5
X1

10 bar
290 bar
310 Bar
2.0 bar
0.3 bar
145/275 Bar
205 Bar
225 Bar
1.0 mm

SWING
BRAKE

PILOT
ON/OFF

STEERING ENABLE
VALVE
82133012

82143001 UPPER VALVE

SEE AIR SCHEMATIC
FOR PORTS 1 & 2

SEE SHEET 2 FOR
CHASSIS SCHEMATIC

SWIVEL
82133006

DRAWINGS CREATED IN Pro/ENGINEER.
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DIMENSIONS ARE IN INCHES.

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REV	ZONE	DATE	BY	DESCRIPTION	ER NO	CHKD
A	ALL	50ct16	RCD	REVISE VARIOUS COMPONENT PART NUMBERS.	NONE	RCD

REVISIONS

SPECIFICATIONS
DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
ALL WELDING TO STRUCTURAL WELD CODE-STEEL ANSI/AWS D1.1

NEXT ASSY

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED ALL TOLERANCES ARE AS SHOWN.
ALL ANGLES ±1° UNLESS OTHERWISE SPECIFIED
THIRD ANGLE PROJECTION

DRAWN BY: CES
DATE: 29JUNE15
CHK'D. BY: RAB
DATE: 29JUNE15
E.R. NO. EC 150256
FINISH: N/A
REF. DWG. NONE
MACH. SURF. 125 MAX

GRADALL

TITLE: SCHEMATIC, D152 HYDRAULIC

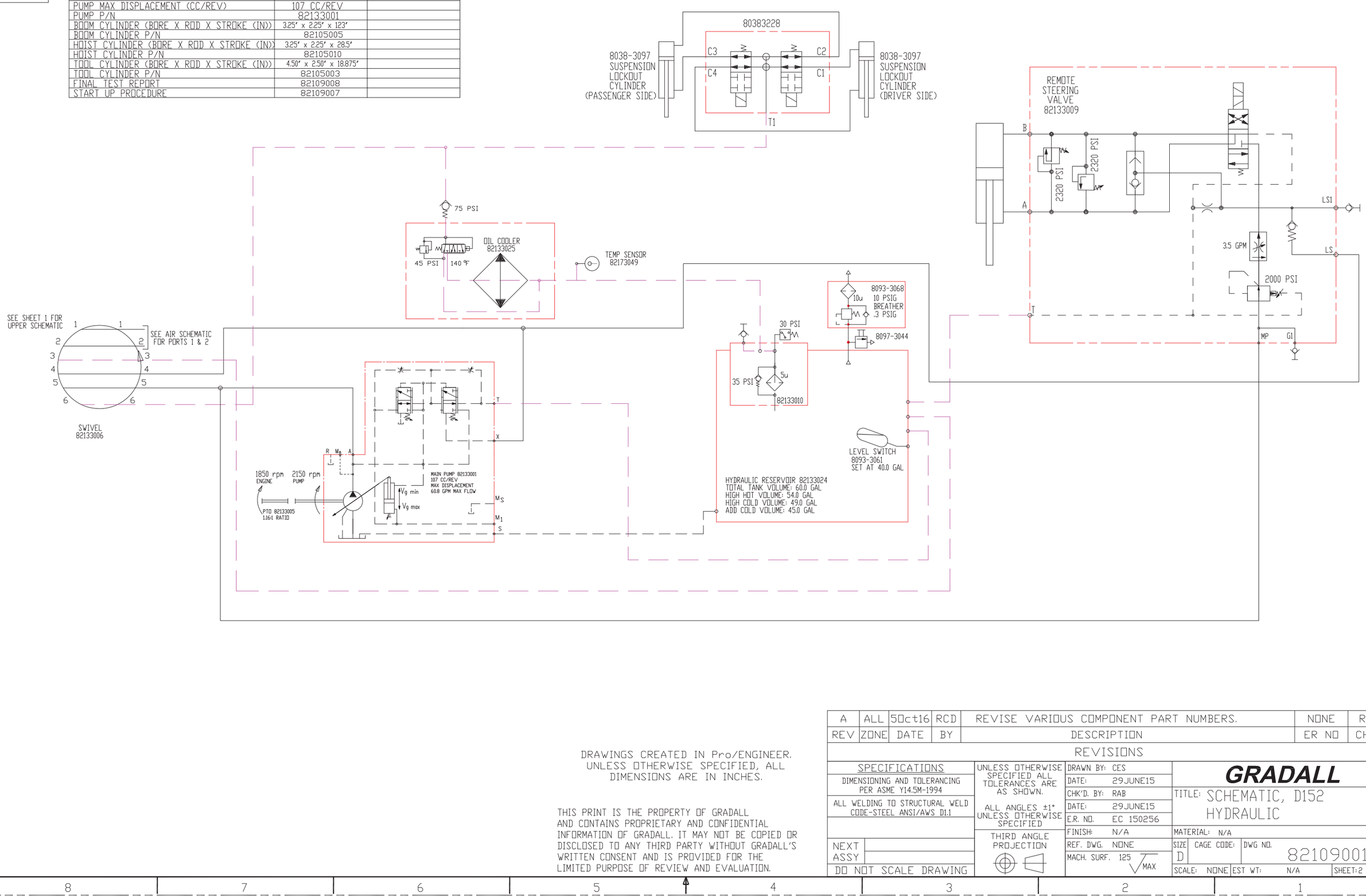
MATERIAL: N/A

SIZE D | CAGE CODE: | DWG NO. 82109001 | REV A

SCALE: NONE | EST WT: N/A | SHEET: 1 OF 2

DRAWING NUMBER
82109001

DESCRIPTION	ARIZONA	
PUMP MAX DISPLACEMENT (CC/REV)	107 CC/REV	
PUMP P/N	82133001	
BOOM CYLINDER (BORE X ROD X STROKE (IN))	3.25" x 2.25" x 123"	
BOOM CYLINDER P/N	82105005	
HOIST CYLINDER (BORE X ROD X STROKE (IN))	3.25" x 2.25" x 28.5"	
HOIST CYLINDER P/N	82105010	
TOOL CYLINDER (BORE X ROD X STROKE (IN))	4.50" x 2.50" x 18.875"	
TOOL CYLINDER P/N	82105003	
FINAL TEST REPORT	82109008	
START UP PROCEDURE	82109007	



REV	ZONE	DATE	BY	DESCRIPTION	ER NO	CHKD
A	ALL	50ct16	RCD	REVISE VARIOUS COMPONENT PART NUMBERS.	NONE	RCD

REVISIONS

DRAWINGS CREATED IN Pro/ENGINEER.
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SPECIFICATIONS
DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
ALL WELDING TO STRUCTURAL WELD CODE-STEEL ANSI/AWS D1.1

NEXT ASSY

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED ALL TOLERANCES ARE AS SHOWN.
ALL ANGLES ±1° UNLESS OTHERWISE SPECIFIED
THIRD ANGLE PROJECTION

DRAWN BY: CES
DATE: 29JUNE15
CHK'D. BY: RAB
DATE: 29JUNE15
E.R. NO. EC 150256
FINISH: N/A
REF. DWG. NONE
MACH. SURF. 125 MAX

GRADALL

TITLE: SCHEMATIC, D152 HYDRAULIC

MATERIAL: N/A

SIZE	CAGE CODE:	DWG NO.	REV
D		82109001	A

SCALE: NONE | EST WT: N/A | SHEET:2 OF 2

DRAWING NUMBER 82109009

DRAWING NUMBER 82109009 REV. A

UPPER SERVICE BRAKE PEDAL
82163001

SWIVEL
82133006

SEE HYDRAULIC SCHEMATIC
82109001 FOR PORTS 3-6

FROM MANUAL
PARK BRAKE VALVE
(FREIGHTLINER)

3/8" BLACK TUBING

4-1

SPRING BREAK
MODULATING VALVE
(FREIGHTLINER)

85 PSI
REGULATOR
85403220

35 PSI
82173051

SHUTTLE
86683293

70 PSI
82173015

PARK/
DIG BRAKE VALVE
2110390001

TRAVEL/REMOTE
AIR VALVE
2110390002

CHASSIS
SERVICE BRAKE PEDAL
(FREIGHTLINER)

TO FRONT
SERVICE RELAY
1/2" RED TUBING

TO REAR
SERVICE RELAY
3/8" GREEN TUBING

TO BRAKE
LIGHT SWITCH
(CHASSIS CAB)
1/4" ORANGE TUBING

SECONDARY AIR TANK
(FREIGHTLINER)

DRAWINGS CREATED IN Pro/ENGINEER.
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REV	ZONE	DATE	BY	DESCRIPTION	ER NO	CHKD
				REVISIONS		
A	C6	11Jan16	AF	CHANGED THE BRAKE PRESSURE SWITCH TO 35 PSI.	EC160013	RAB

SPECIFICATIONS	
DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994	
ALL WELDING TO STRUCTURAL WELD CODE-STEEL ANSI/AWS D1.1	
NEXT ASSY	
DO NOT SCALE DRAWING	
UNLESS OTHERWISE SPECIFIED ALL TOLERANCES ARE AS SHOWN. ALL ANGLES ±1° UNLESS OTHERWISE SPECIFIED	
THIRD ANGLE PROJECTION	
DRAWN BY: CES	
DATE: 30JUNE15	
CHK'D. BY: RAB	
DATE: 30JUNE15	
E.R. NO. EC 150256	
FINISH: N/A	
REF. DWG. NONE	
MACH. SURF. 125 MAX	

GRADALL

TITLE: SCHEMATIC, D152 AIR

MATERIAL: N/A

SIZE	CAGE CODE:	DWG NO.	REV
D		82109009	A

SCALE: NONE EST WT: N/A SHEET: 1 OF1

GRADALL D Series System Operation



Introduction

System operation of the D Series Gradall machines covers the functions of the hydraulic excavator. The system operation will also address specific chassis functions that are necessary to the hydraulic excavator function. Chassis functions not necessary for excavator operation will not be covered or supported by *GRADALL.*

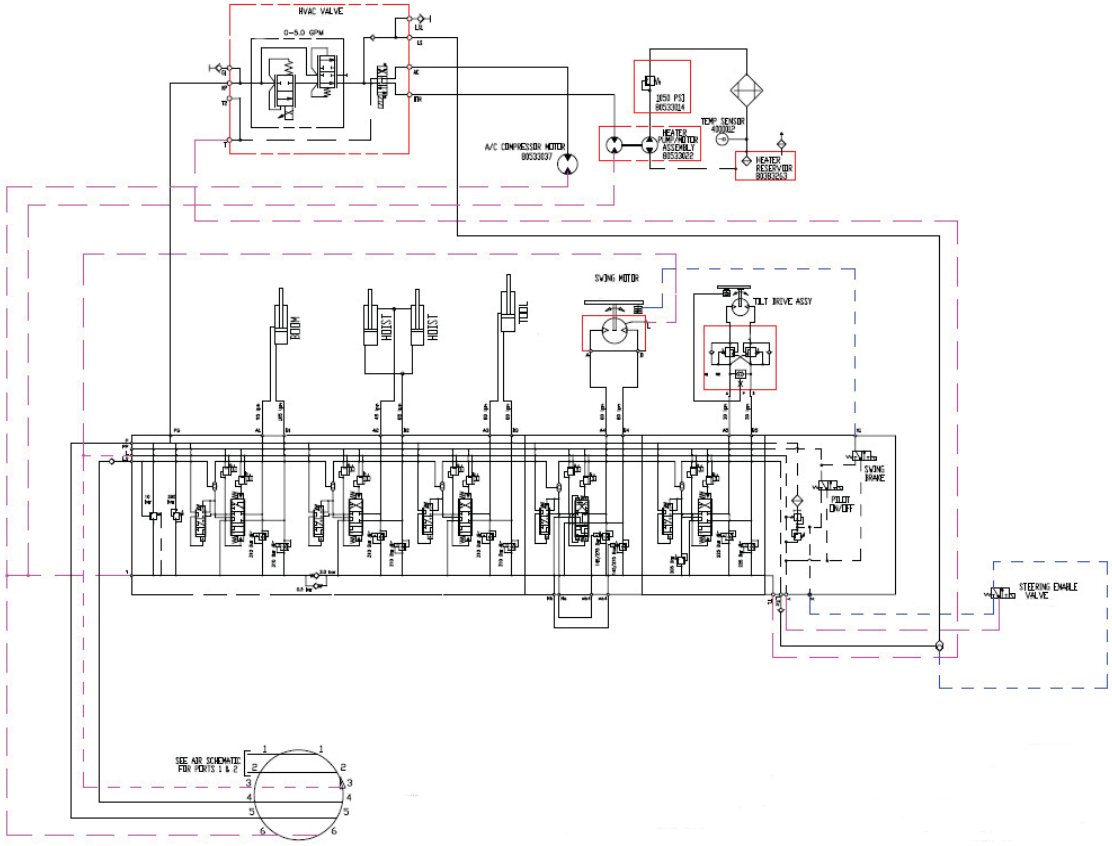
Each chapter of the system operation will cover hydraulic, mechanical, electrical, and troubleshooting of the function or circuit in the chapter. If other documentation is needed, it will be referenced within the chapter (schematics, charts, etc.)

System Operation

D Series system operation will provide an explanation of all systems in the D Series *Gradall* Hydraulic Excavator. Rather than a complete system view, system operation will be in individual circuit explanation.

The D Series is a hybrid excavator using a *GRADALL* Excavator mounted to a commercial truck chassis. The excavator uses engine power and drive train of the truck chassis to provide hydraulic power to the excavator and remote drive for the excavator.

Certain truck chassis systems are used by the excavator to provide excavator functions. But the truck uses no excavator integration for over the road travel.

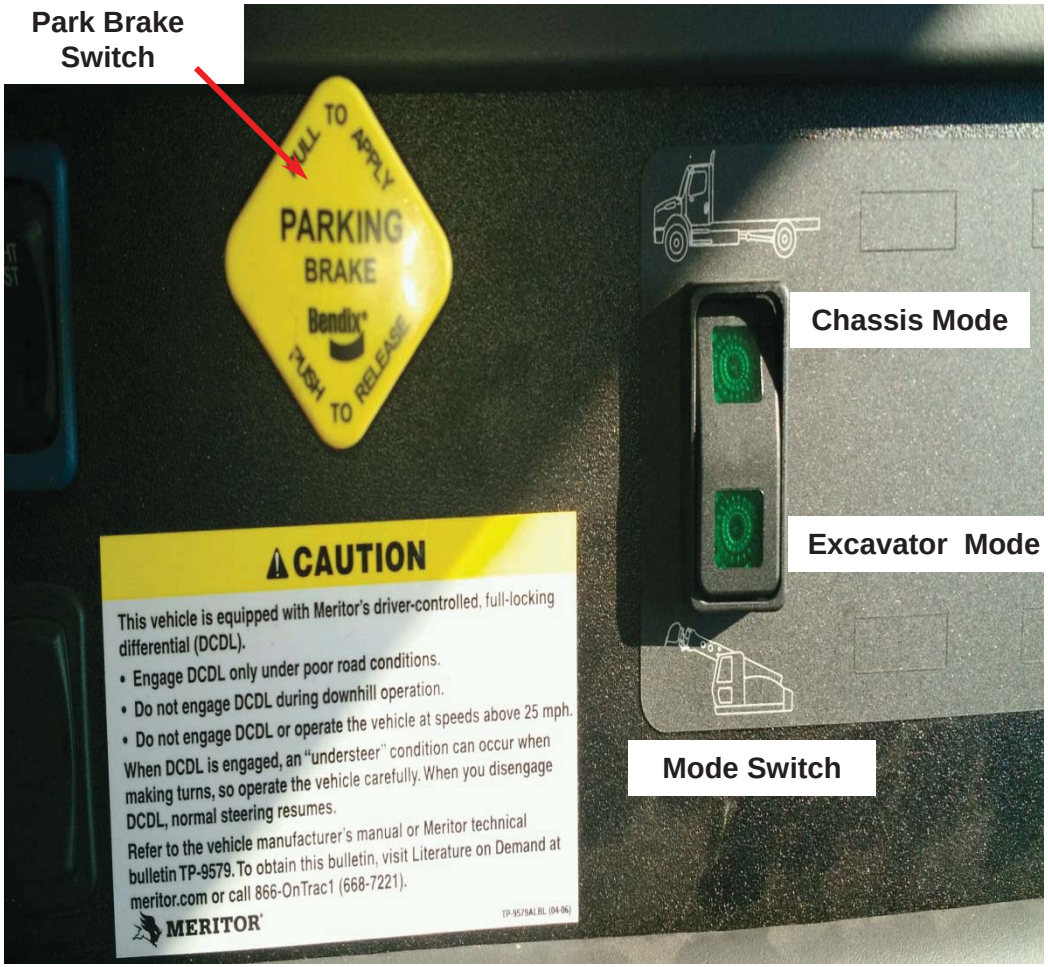


Chassis Controls

D Series chassis controls consist of a mode switch and parking brake valve. To operate the excavator, the parking brake must be set, transmission must be in neutral, and mode switch set to Excavator mode. Chassis key must be off.

When driving from the chassis, the mode switch must be in the Chassis mode position. Park brake and transmission controls are used as a normal chassis.

A battery disconnect is also in the chassis cab beside the driver's seat. This is the primary shutoff for the batteries.



Chassis Controls

A differential lock switch is provided for poor traction conditions. It is recommended to be locked when in excavator mode. However, the chassis software code to allow control of the differential lock switch is “locked” and not accessible from the *GRADALL* side. The differential lock must be manually switched after going into excavator mode with the upper key on.

The transmission shift pad is a standard shift pad as provided by the chassis manufacturer and comes with the transmission. Direction of travel can be selected from the shift pad. Transmission status is also displayed on the shift pad.



Differential Lock Switch

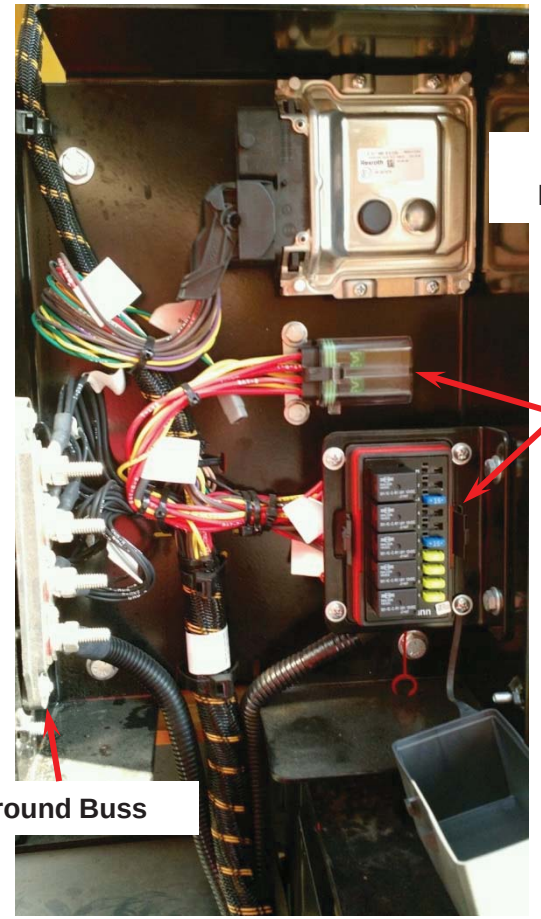
Transmission Shift Pad

Chassis Electrical

CHASSIS FUSE BOX				
100				
STD or OPT	WIRE	#	DESCRIPTION	RATING
O	-	F1	Empty	-
O	BAT-102	F2	Spare BAT-102 (Strobe)	15
S	BAT-103	F3	R2, Remote Relay	15
O	BAT-104	F4	Spare BAT-104 (Strobe)	15
O	-	F5	Empty	-
S	BAT-106	F6	Expansion Module PWR	15
S	BAT-107	F7	Upper PWR	20
S	BAT-108	F8	Upper PWR	20
S	BAT-109	F9	Upper PWR	20
S	BAT-110	F10	Upper PWR	20
S	IGN-2	R1	Ignition Relay	-
S	REMOTE	R2	Remote Relay	-
S	PROPEL	R3	Propel Relay (Axle Lock/Dig Brake)	-
S	FAN1	R4	Fan 1 Relay	-
S	FAN2	R5	Fan 2 Relay	-
STD or OPT		#	DESCRIPTION	RATING
S	IGN-4	F1	R1, Ignition-4 (Chassis Cab)	15
S	FAN2	F2	R5, Fan 2	30
S	IGN-3	F3	R1, Ignition-3 (Expansion Module, Chassis Switch PWR, Travel Valve PWR)	15
S	FAN1	F4	R4, Fan 1	30

82173021

Fuse/Breaker Decal inside cover of electrical panel.



Mounted to the boom rest on the DS of the machine is an electrical panel. Chassis processor, fuses, relays, and circuit breakers are located in the panel. A decal on the cover lists fuse and breaker sizes along with the circuit they are used with.

The chassis processor does not have a diagnostic connector. 82173061 is used for a diagnostic connector it must be plugged into the Deustch connector near the processor. The terminating resistor MUST be installed to use.

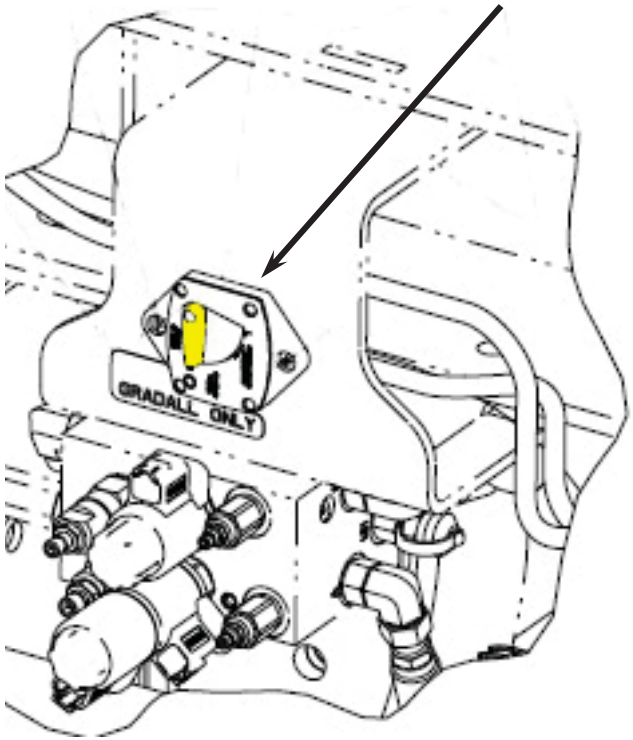
Chassis Electrical

A 100A circuit breaker is installed between the batteries and chassis electrical box. The breaker is installed next to the battery box.

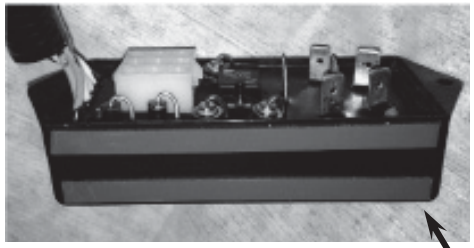
DO NOT OPERATE chassis with the circuit breaker turned off. You will have transmission faults and likely lose transmission operation. Freightliner dealers charge $656.00 to turn on the breaker!

The breaker is only used if you must isolate the chassis from the upper.

100A Circuit Breaker

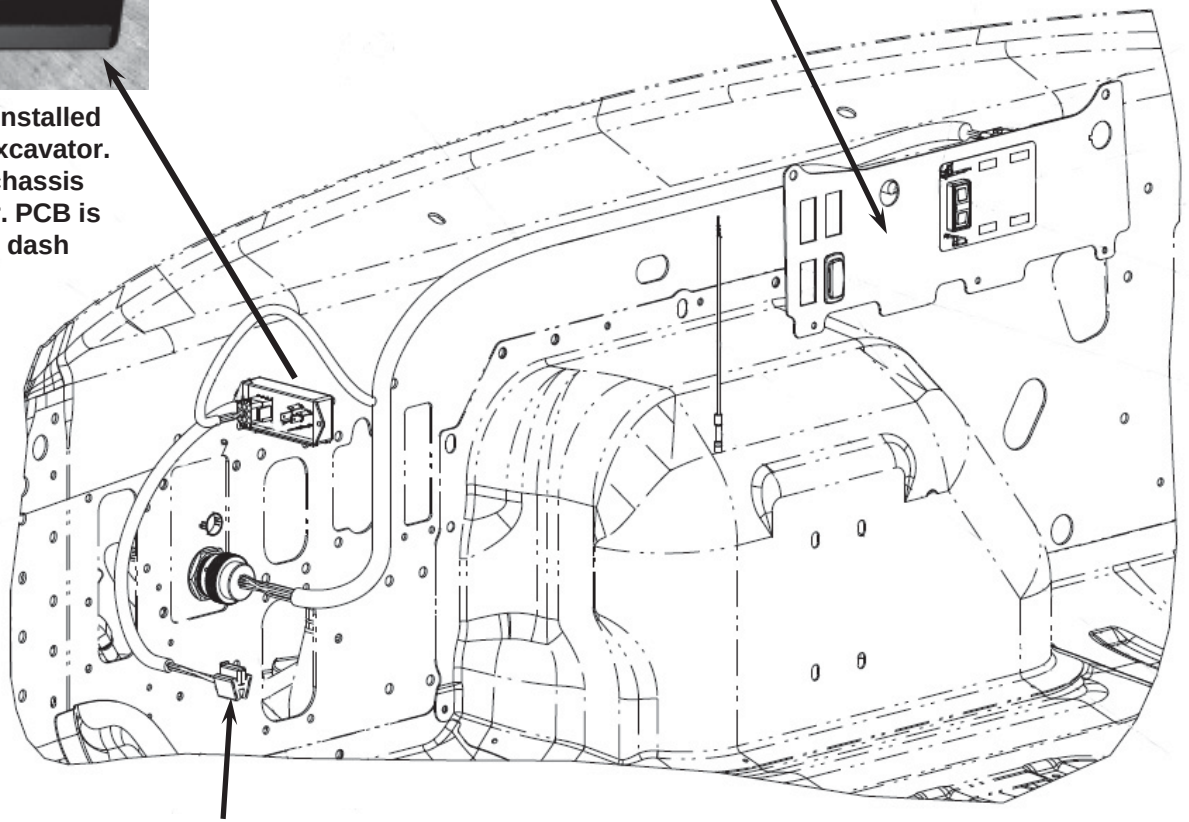


Chassis Electrical



Ignition switch PCB is installed between chassis and excavator. This allows control of chassis ignition from excavator. PCB is installed under chassis dash

Cab switch plate is installed with mode switch. Optional switches are installed as needed

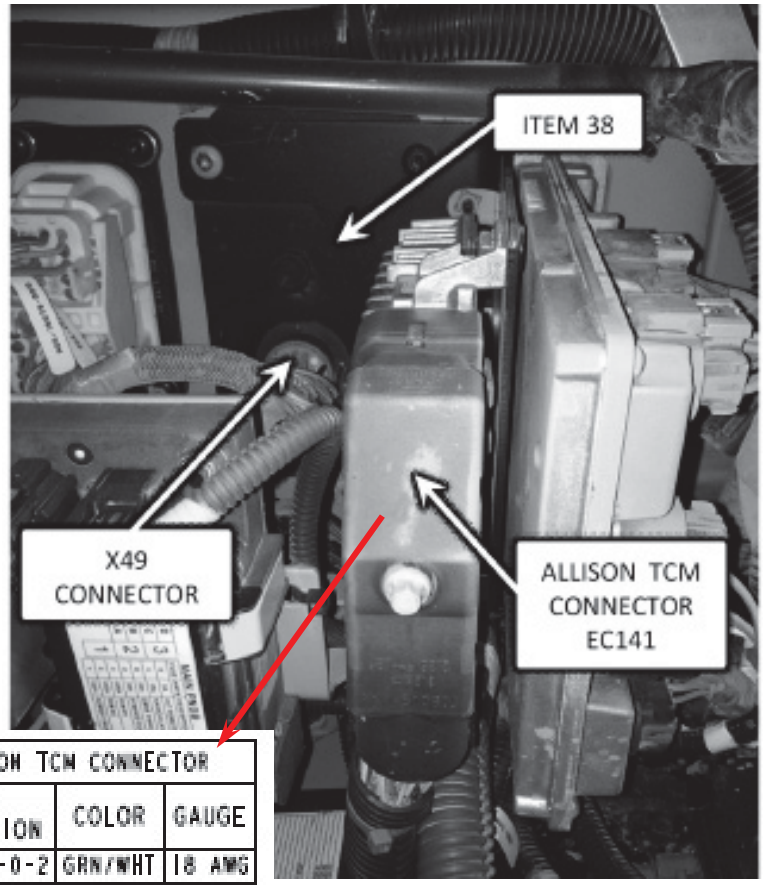


To chassis ignition switch

Chassis Transmission Interface

Interface between excavator remote drive and the Allison TCM is shown. 5 wires from the *GRADALL* processor to the transmission controller are involved in the operation of the transmission from the excavator.

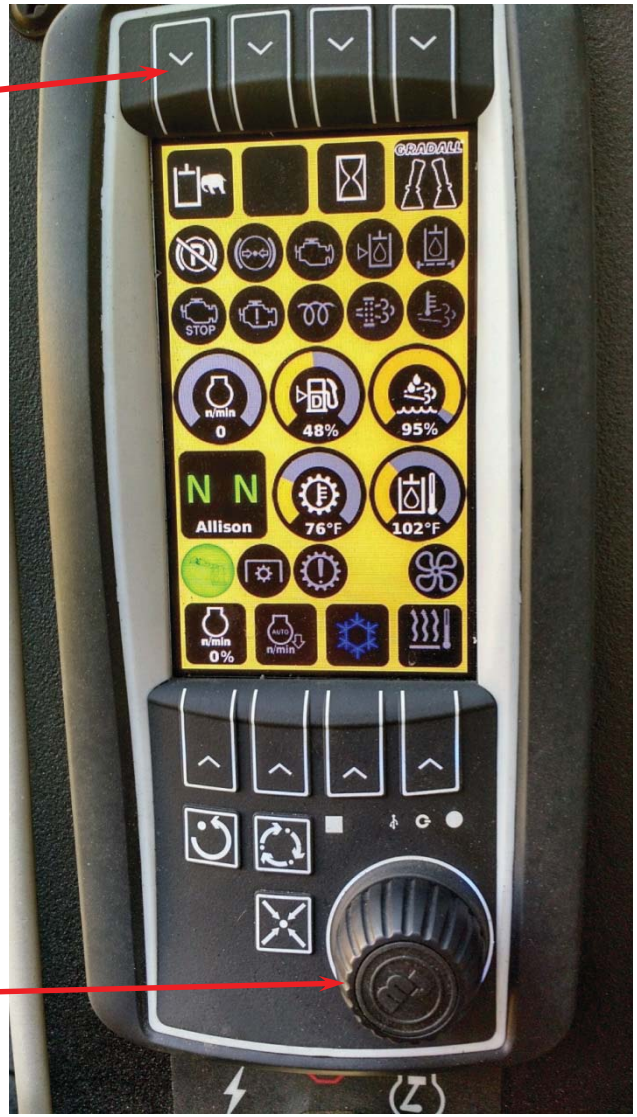
Also shown are the connector (X49) between the module harness and cab and mounting plate (Item 38) for the connector.



EC141 ALLISON TCM CONNECTOR			
CONN POS	WIRE DESIGNATION	COLOR	GAUGE
1	TRAVEL SW-0-2	GRN/WHT	18 AWG
14	ALSN 114 SS-4	TAN/ORG	18 AWG
38	ALSN 138 SS-P	TAN/YEL	18 AWG
53	ALSN 153 SS-2	TAN/GRN	18 AWG
73	ALSN 173 SS-1	TAN/BLU	18 AWG

Upper Electrical

Soft Touch Button
(Function Select)



Selection
knob

A new display is introduced on the D series machines to provide additional information and simplify the control function in the excavator cab. The display has soft touch controls selection.

Toughing the soft touch button puts the display in the select mode, turning the selection knob changes the selection.

Upper Electrical

Control selection is shown as an example. Turning the knob will allow access to JDP or SAE pattern. The pattern will be active on the next key on.



Upper Electrical

Fuse and relay panel for the excavator are located in the console in the excavator cab. This is the same location as the circuit board in other *GRADALL* machines.

A decal is provided for fuse rating and circuit protected





UPPER FUSE BOX

300

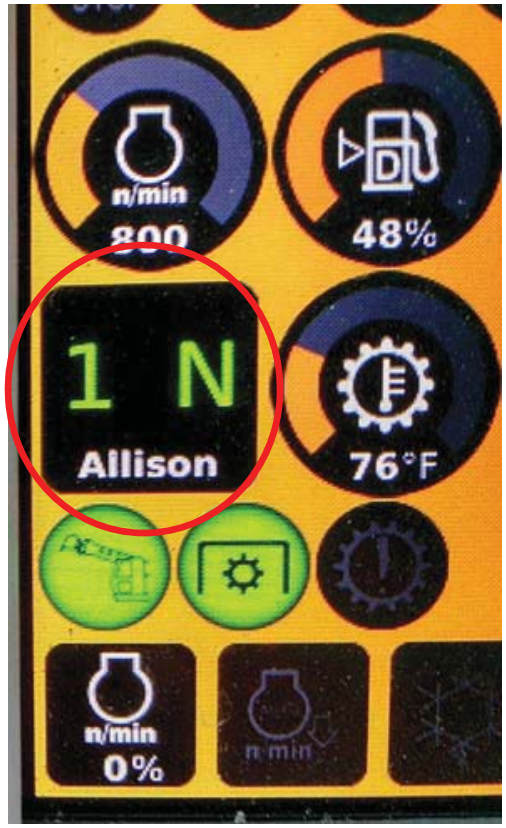
STD or OPT	WIRE	#	DESCRIPTION	RATING
S	AC FAN-301	F1	R1, AC Fan	25
S	AC PWR-302	F2	R1, AC Clutch	10
O	CAB LT-303	F3	R2, Cab Lights	20
O	WORK LT-304	F4	R2, Work Lights	15
S	WASH-305	F5	Washer Fluid	10
S	IGN-306	F6	Ignition (Display, Joysticks, Pedal, Controller)	10
S	IGN-307	F7	Ignition (Valve PWR)	15
O	-	F8	Empty	-
O	-	F9	Empty	-
S	IGN	F10	Ignition Diode	Diode
S	AC	R1	AC Relay	-
O	WORK LT	R2	Work Lights Relay	-
O	BOOM LT	R3	Boom Lights Relay	-
S	HORN	R4	Horn Relay	-
S	IGN-7	R5	Ignition Relay	-

200

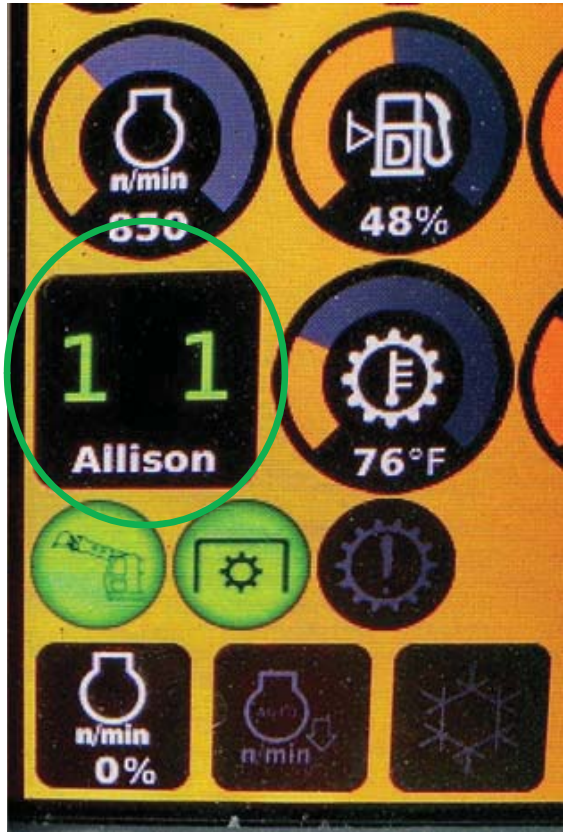
STD or OPT	WIRE	#	DESCRIPTION	RATING
S	BAT-201	F1	BAT, (LCD, Main Controller)	5
O	BAT-202	F2	Spare BAT-202, Radio (not required for current radio)	15
S	BAT-203	F3	Diagnostic PWR	10
O	BAT-204	F4	Spare BAT-204	15
O	BAT-205	F5	R3, Boom Lights	20
O	BAT-206	F6	Spare BAT-206	15
S	BAT-207	F7	R4, Horn	15
S	BAT-208	F8	Controller PWR	15
O	-	F9	Empty	-
S	BAT-210	F10	Controller PWR	15
S	ACC-211	F11	L.H. Switch, Pod Light and Dome Light PWR	15
S	ACC-212	F12	R.H. Switch, Pod Light and Radio PWR	15
O	-	F13	Empty	-
S	ACC-214	F14	Upper Switch PWR	15
O	-	F15	Empty	-
O	ACC-215	F16	Spare ACC-216 and OPT 1 Switch PWR	15
O	ACC-217	F17	Spare ACC-217, OPT 2 Switch and Upper Strobe PWR	15
S	ACC-219	F18	Upper Cab Wiper PWR	10
S	ACC-220	F19	HVAC PWR	20
S		F20		25

82173022

Remote Drive



Brake pedal depressed



Travel pedal depressed

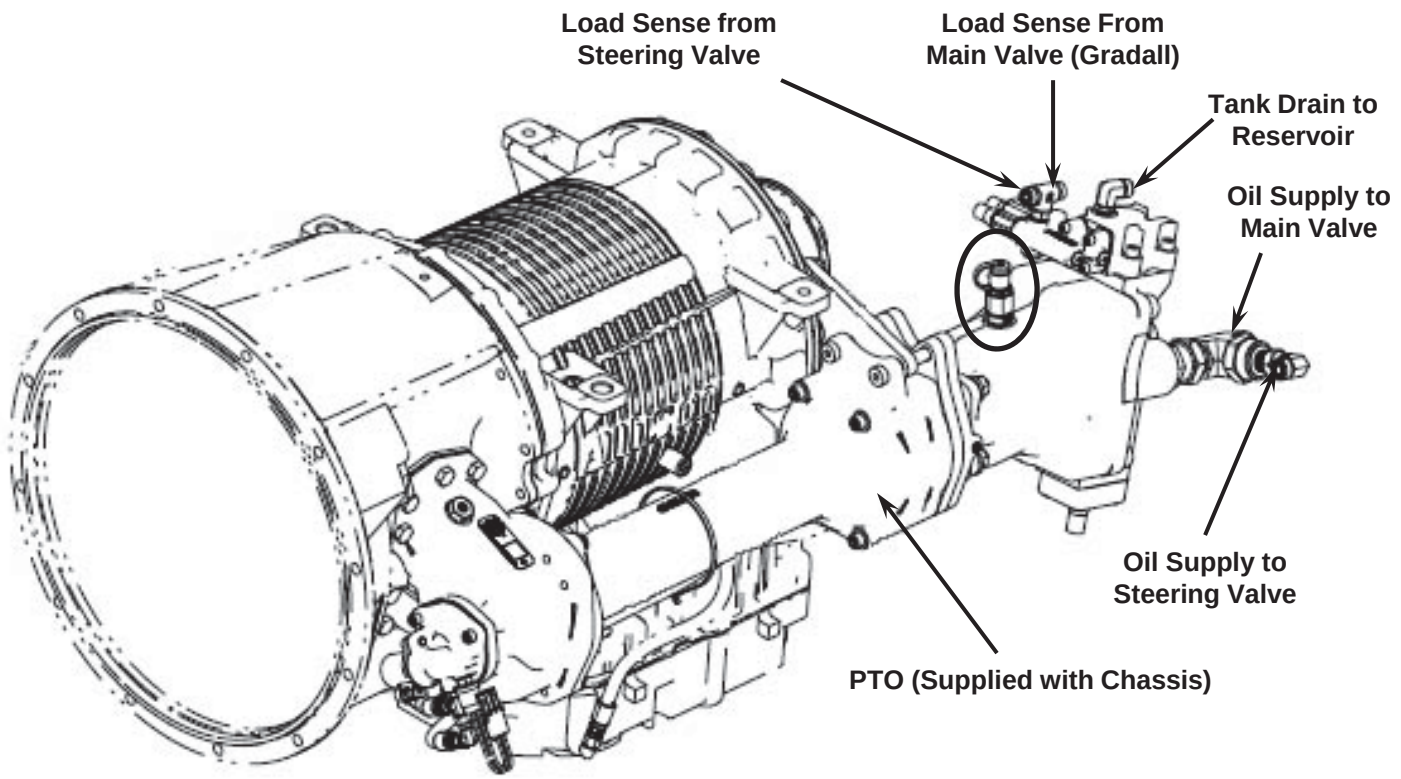
Remote drive in the D series uses the chassis transmission to provide drive. To engage drive, operator depresses the brake pedal to actuate the drive selection. Then the operator uses the travel pedal to select direction and speed.

Upper Processor

D series machines use a similar series processor XL S-V RT & CR machines. It is a newer series processor (series 30) which has more available functions than the XL series 20 processors (SIII & SIV machines).

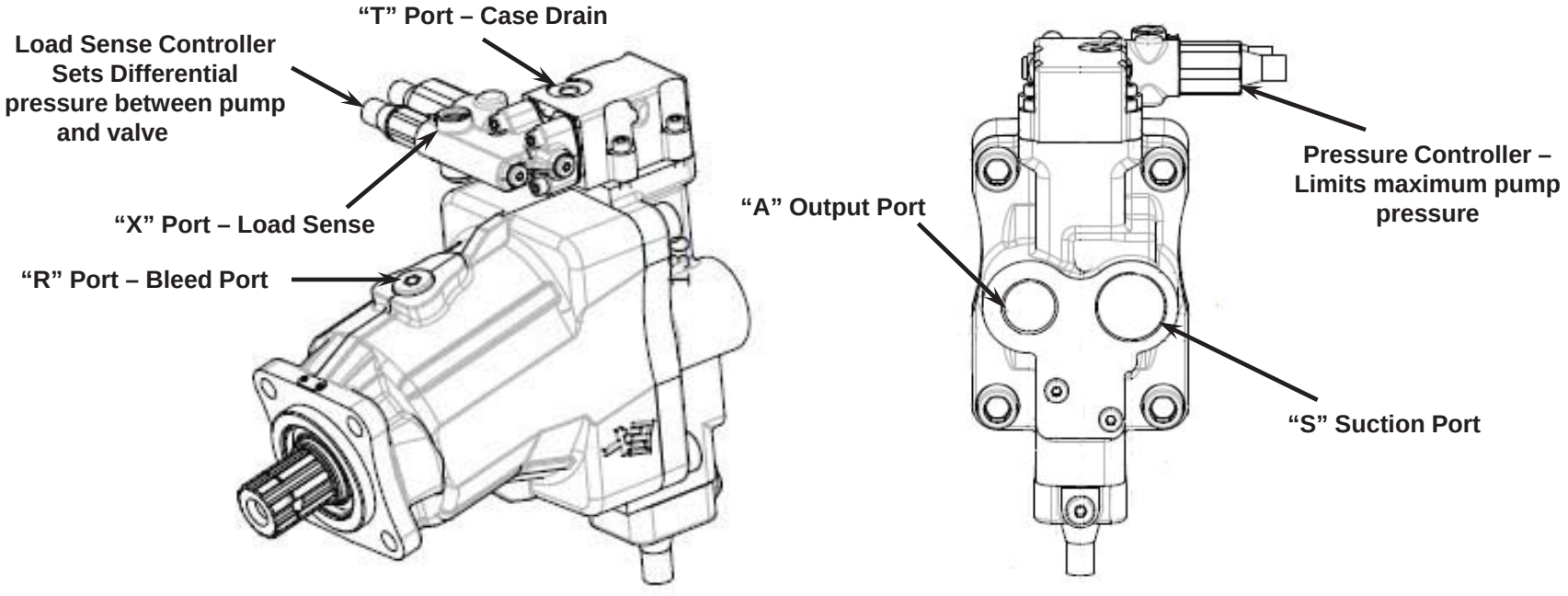
The major change is communication cables. The newer processors use CAN communications rather than serial of the older machines. See XL system operation for BODAS and cables.

Main Pump Drive



Main pump is driven by a PTO mounted to the transmission. PTO is supplied as part of the chassis assembly.
PTO is constantly engaged, main pump is driven anytime engine is running. Pump is driven at 1.16-1 ratio through the PTO.
The PTO is supplied with the chassis and is not serviced by *GRADALL.* Contact the chassis dealer for any service/parts for the PTO.
The pump is mounted to the PTO by *GRADALL.* Any service to the pump or the pump mounting should be performed by an authorized *GRADALL* distributor.
All hydraulic connections between the pump and machine are shown in the above illustration.

Main Pump

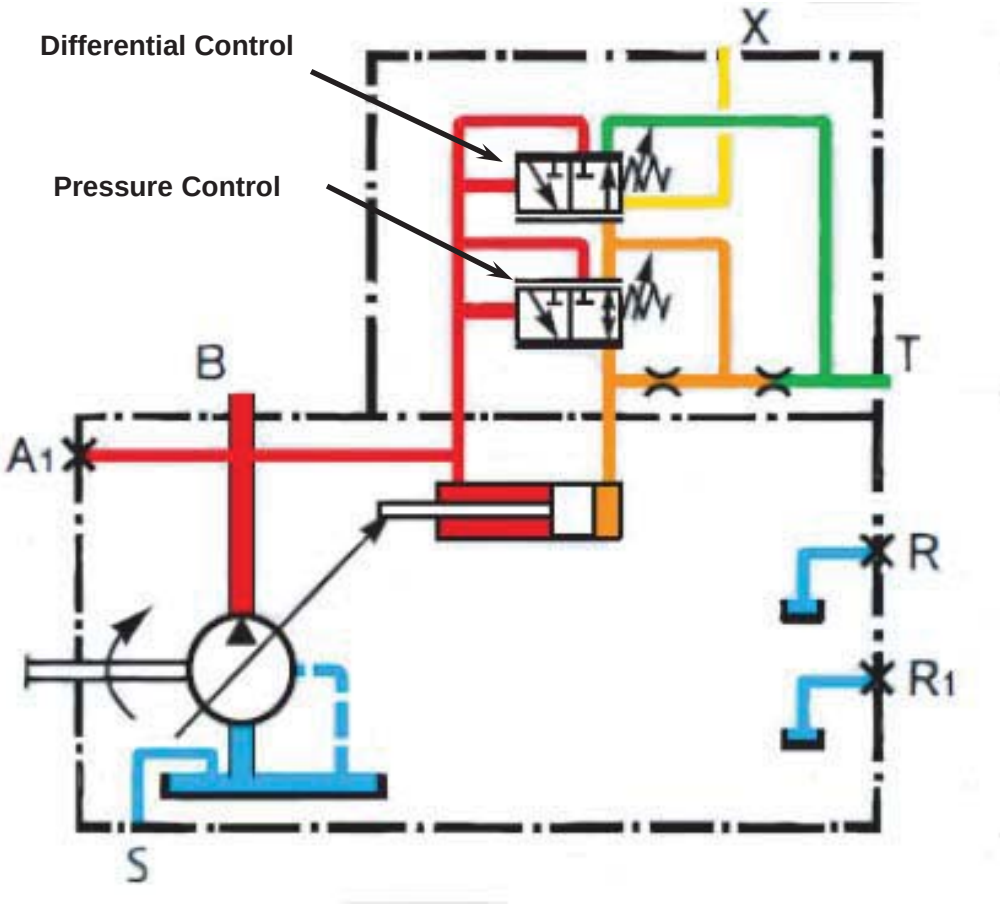


Main pump controls and ports are shown above. Pump uses a simple differential control adjustment. Differential is set using boom out stalled, gauge on LS & G1 ports for difference.

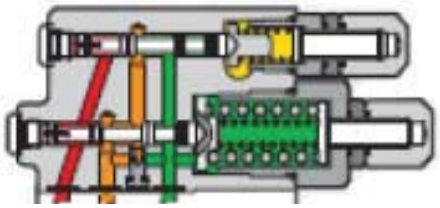
Pump also has a maximum pressure setting to protect system from overpressure.

Main Pump Schematic

Schematic view of main pump.

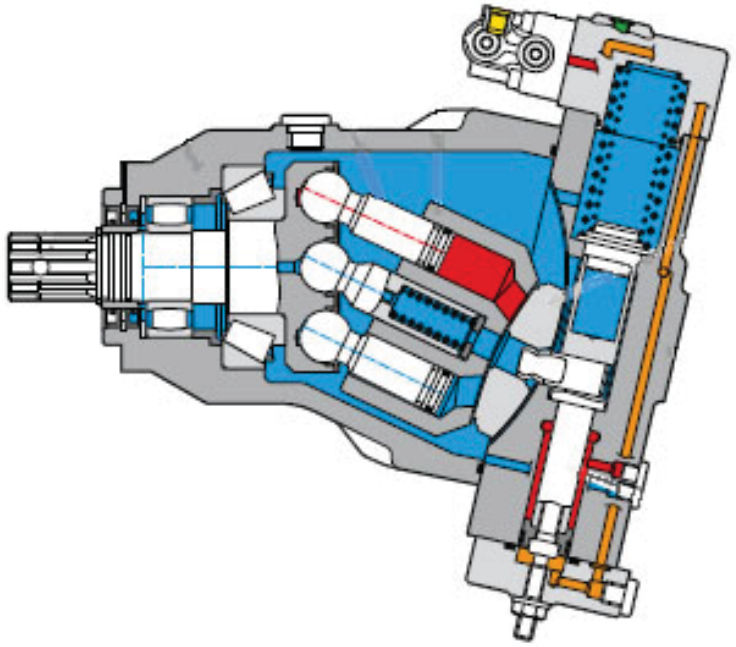


Main Pump Cross Section

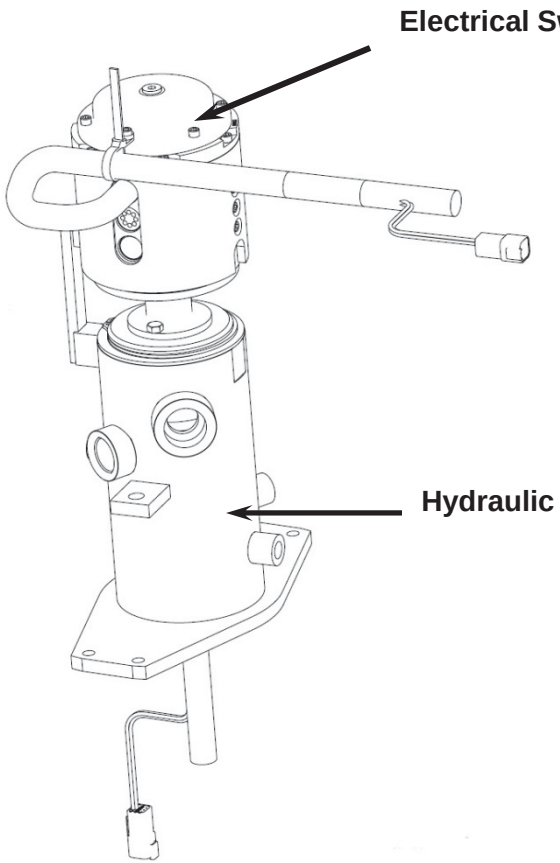


Main pump is a bent axis, variable displacement piston pump. The pump is configured specifically to fit on a PTO drive on a transmission.

The pump uses load sensing controls to match pump flow requirements to system demand. The pump uses “differential” pressure between load sense and pump output (LS – G1) to provide proper pump response.



Center Pin Assembly

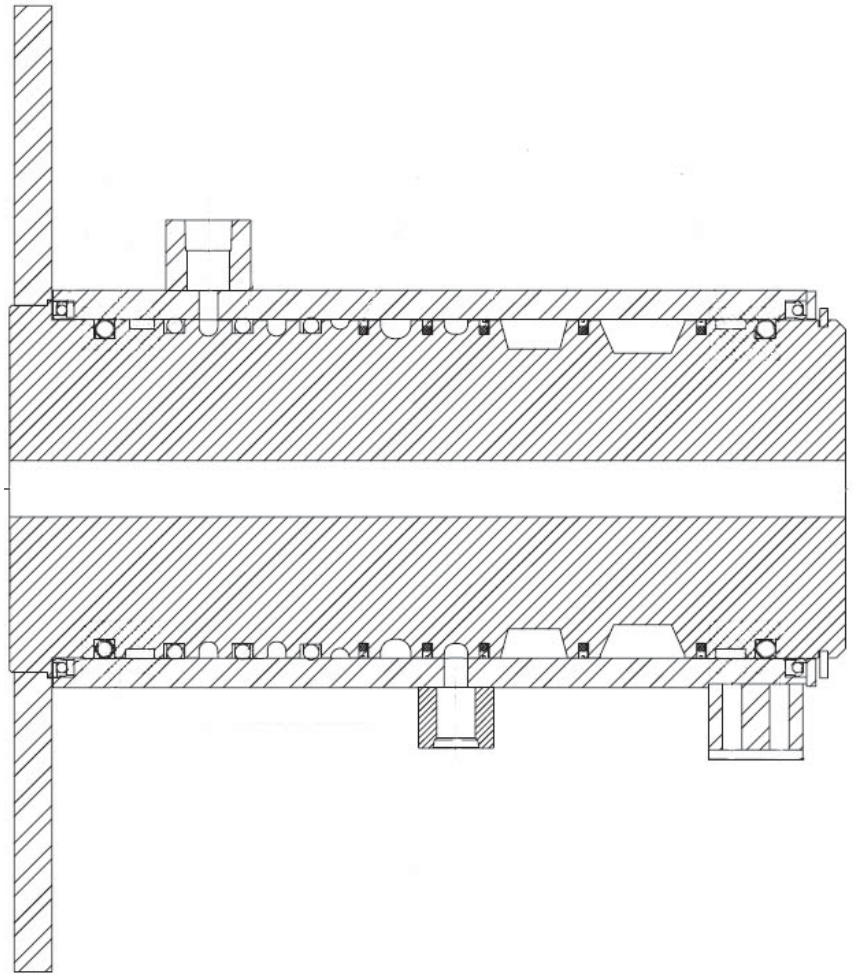


The center pin is similar to the center pin used in other *GRADALL* highway speed models. The center pin is physically smaller, but is of similar design and construction. An electrical swivel is provided to provide electrical system to pass through for the excavator.

The D series center pin does have ports for air from the chassis to be supplied to the excavator. The excavator brake signal passes through the center pin.

Center Pin

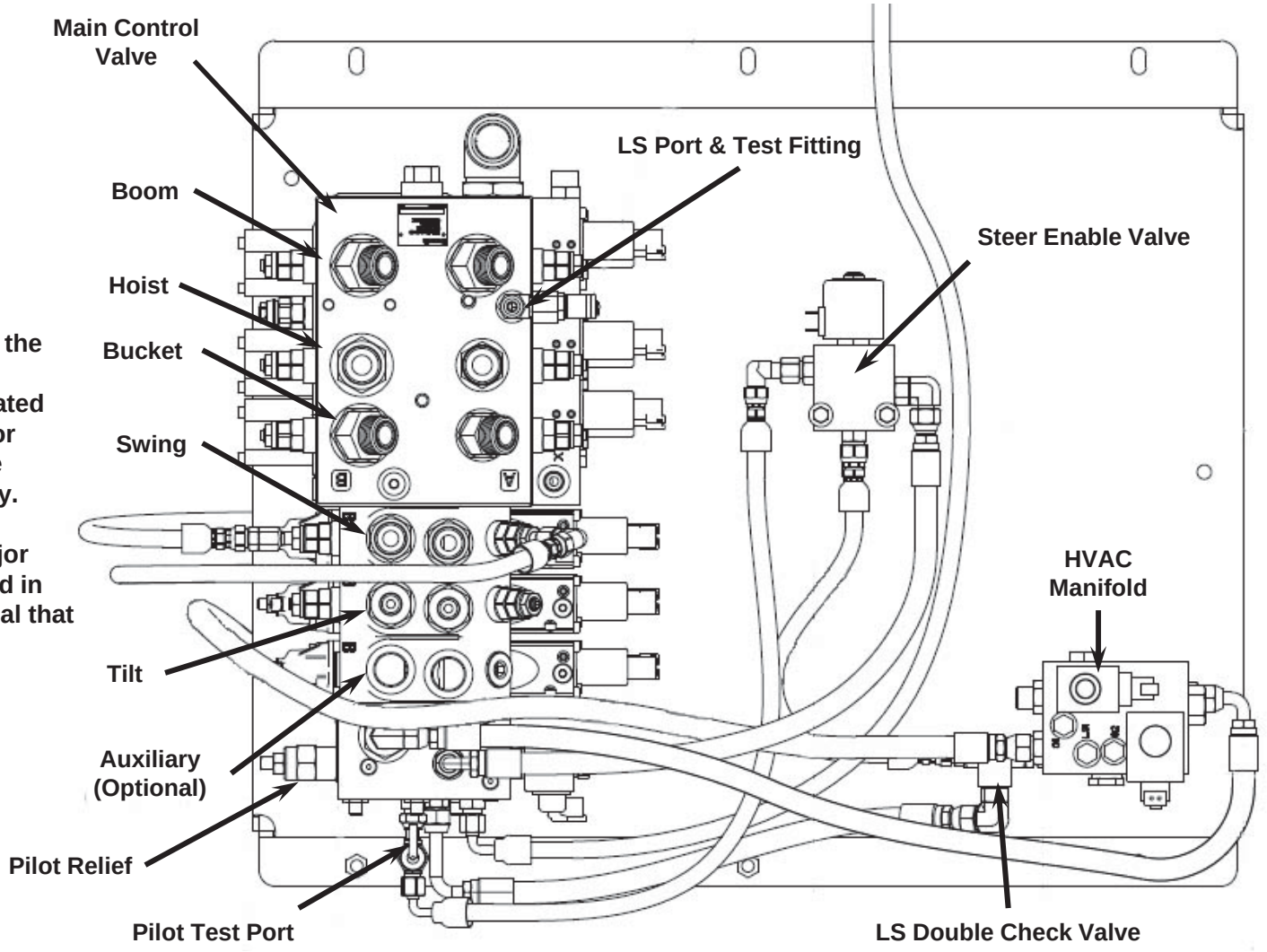
LS port is adjacent to the tank port in center pin. Seal leak between LS & T will result in slow function and low power.



Valve Tray Component Location

Valve tray is located on the LH side of the D Series Excavator. All valve related components required for excavator operation are located on the valve tray.

More detail on each major component will be found in the section of the manual that covers that specific component.

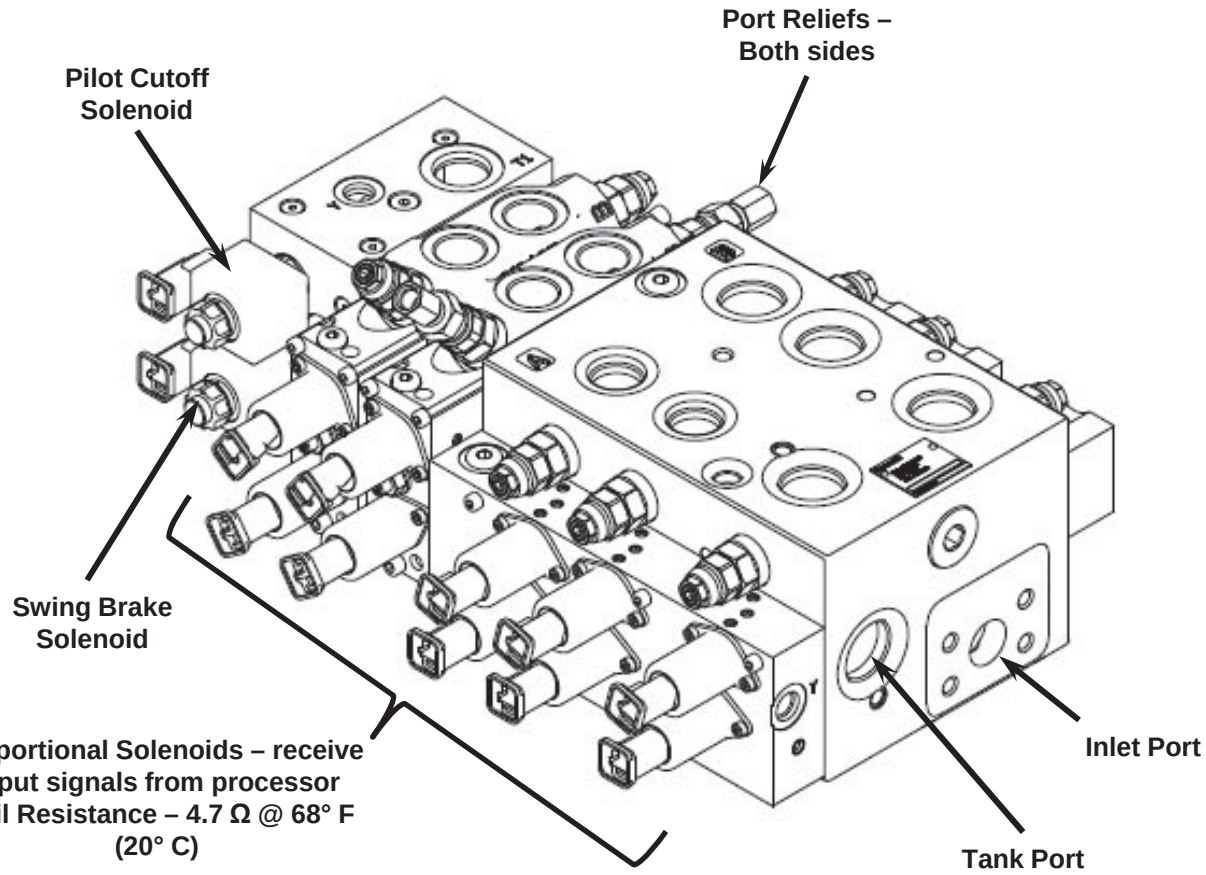


Main Control Valve

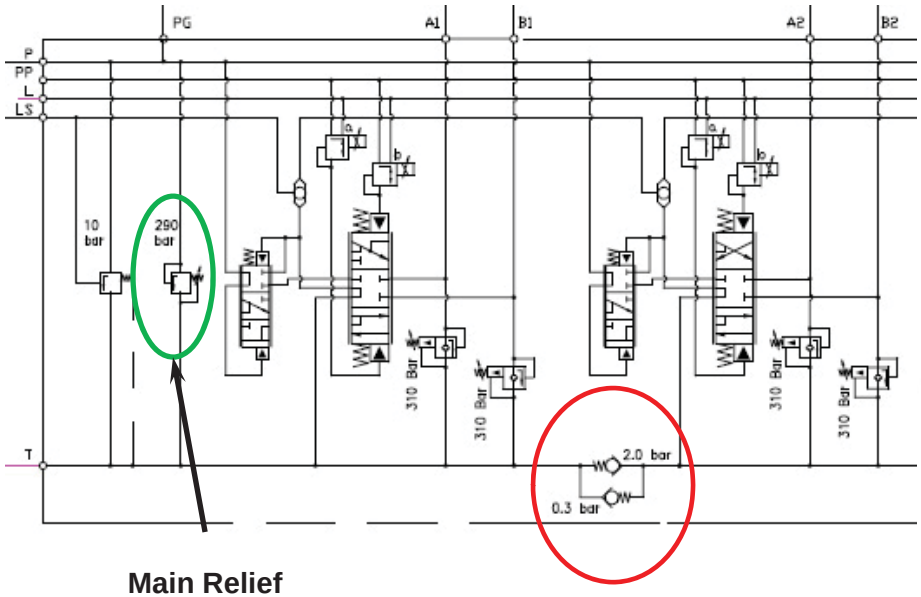
Main control valve consists of a 3 spool monoblock valve, 2 or 3 individual add on sections, and an end cover with additional valves for pilot and other functions.

The main valve is a closed center, load sensing, pressure compensating valve. Each valve section has a pressure compensator spool that maintains constant flow to a spool regardless of change of load sense pressure.

A shuttle system in the valve allows the highest load work port to be the signal to the pump. When a function is not being used, that specific section vents load sense to tank.

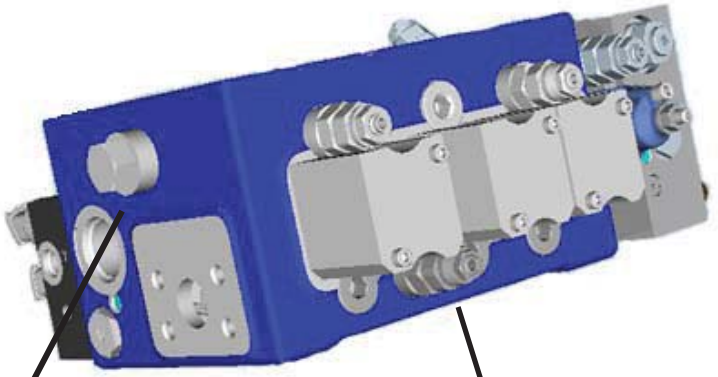


Main Valve



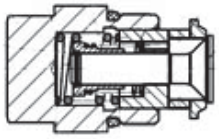
Main Relief

Back Pressure Check

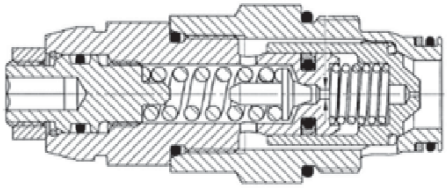


Main valve has a back pressure check and main relief located near inlet end. Back pressure check maintains back pressure to allow anti-cavitation function of the relief valves.

Main relief is actually located on rear of valve under the end caps. 1 full turn of the adjusting screw ≈ 250 bar.

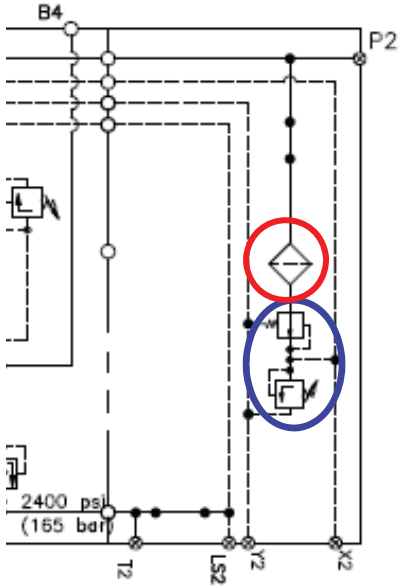


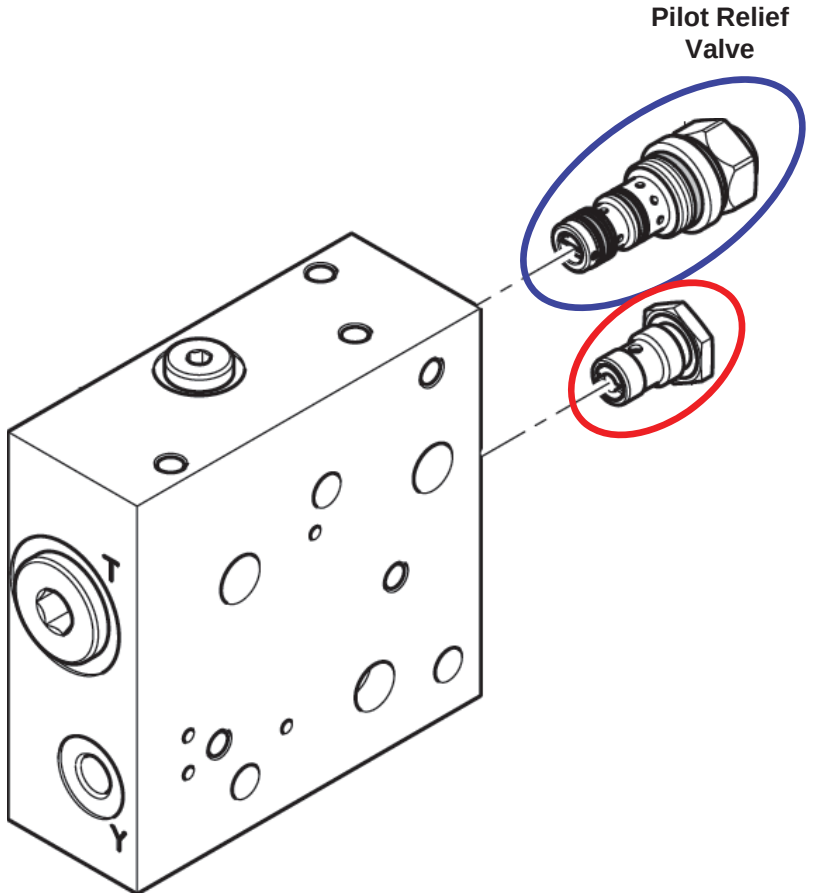
Back Pressure Check



Main Relief

Main Valve - Pilot





Pilot oil is generated from main pump flow inside main control valve end cap. Pilot consists of a screw in filter and an relief valve (500 – 650 PSI).

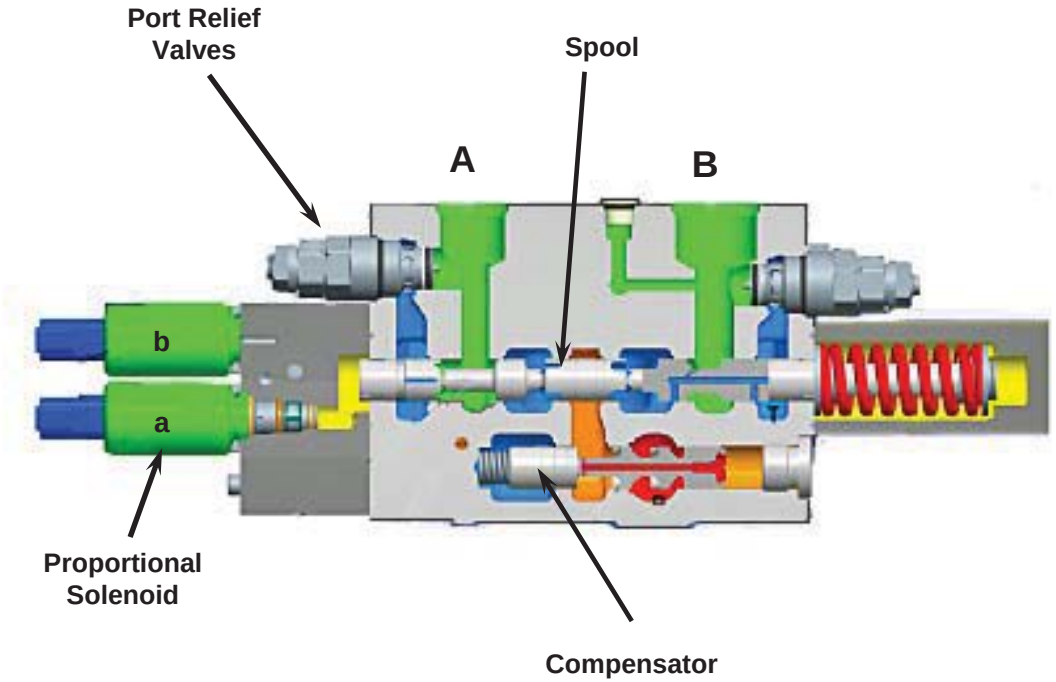
All control valve pilot connections are internal in the control valve assembly.

The end cap also has a solenoid valve for pilot cutoff and swing brake release.

Monoblock Valve Section

Monoblock valve section (boom, hoist, bucket) is a 3 spool block type load sensing, pressure compensated valve. The monoblock is designed to allow sandwich valves to be installed to expand the amount of functions available.

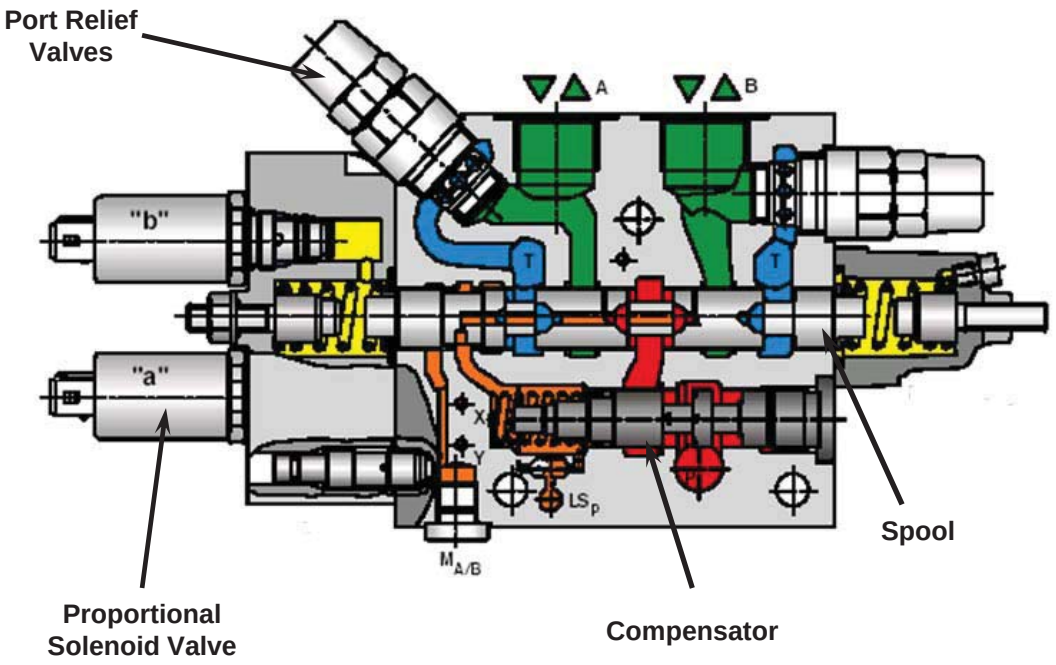
The valve controls volume, direction of oil flow, and maintains constant flow regardless of load conditions.



Section Valves

2 or 3 section valves are added to the monoblock valve to provide additional functions. Standard machines have swing and tilt valves added. An auxiliary valve is available as an option.

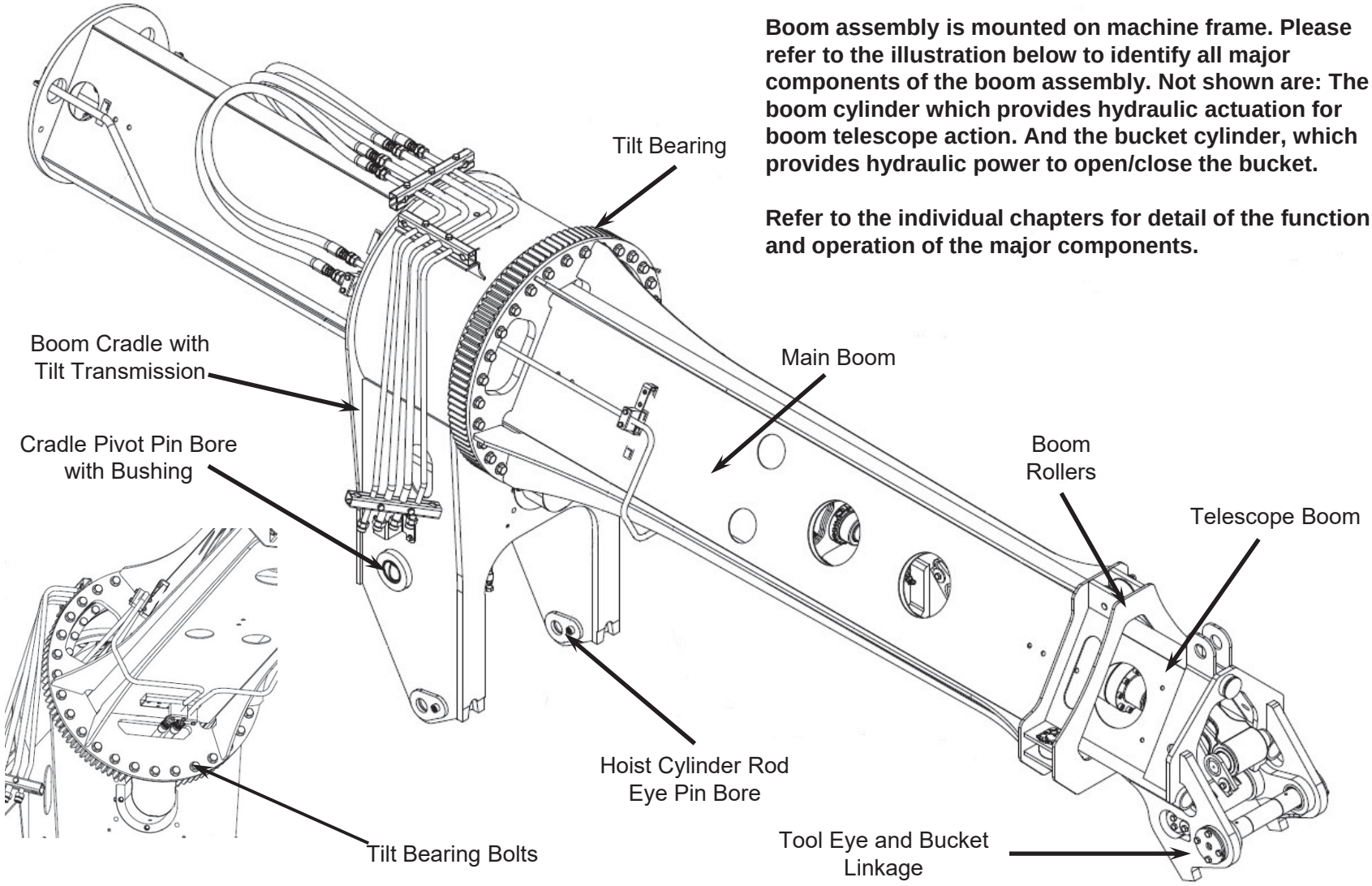
The valve controls volume, direction of oil flow, and maintains constant flow regardless of load conditions.



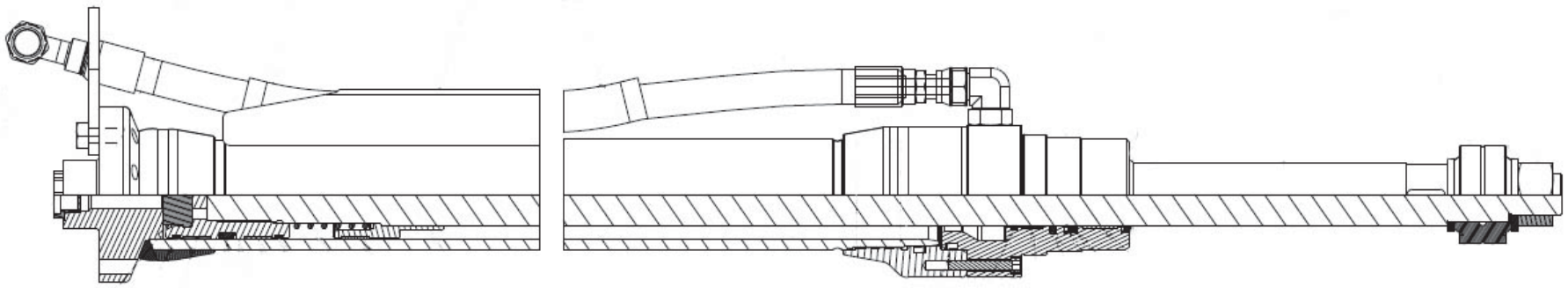
Boom Assembly

Boom assembly is mounted on machine frame. Please refer to the illustration below to identify all major components of the boom assembly. Not shown are: The boom cylinder which provides hydraulic actuation for boom telescope action. And the bucket cylinder, which provides hydraulic power to open/close the bucket.

Refer to the individual chapters for detail of the function and operation of the major components.

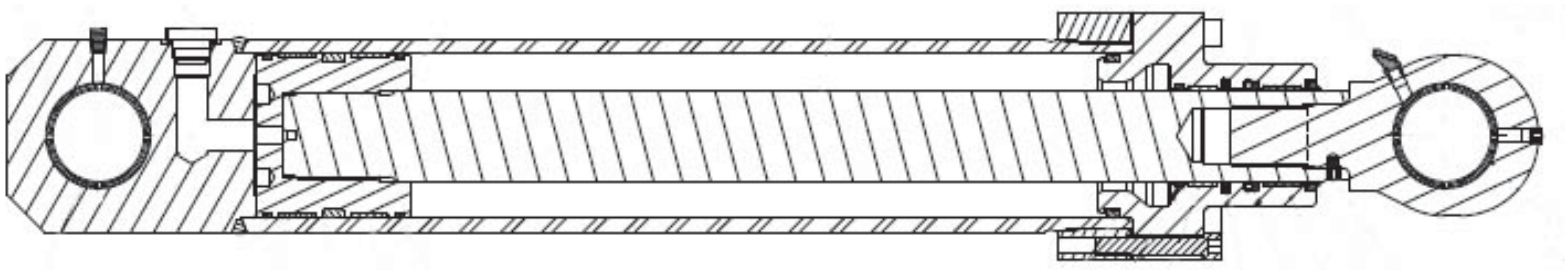


Boom Cylinder



Boom cylinder is a smaller version of boom cylinders used on other *GRADALL* machines

Bucket Cylinder



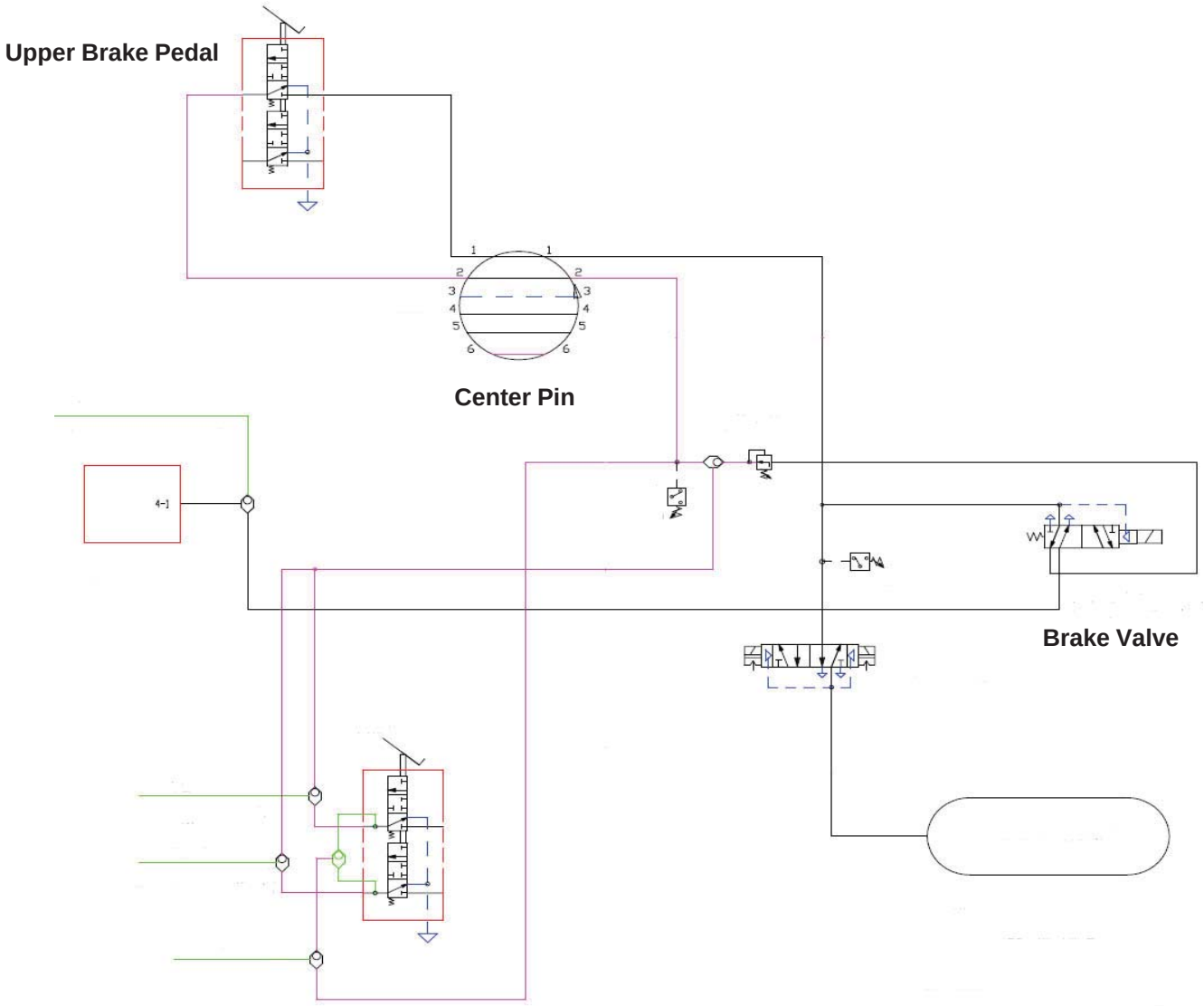
Bucket and hoist cylinders are similar to other GRADALL cylinders.

Climate Control

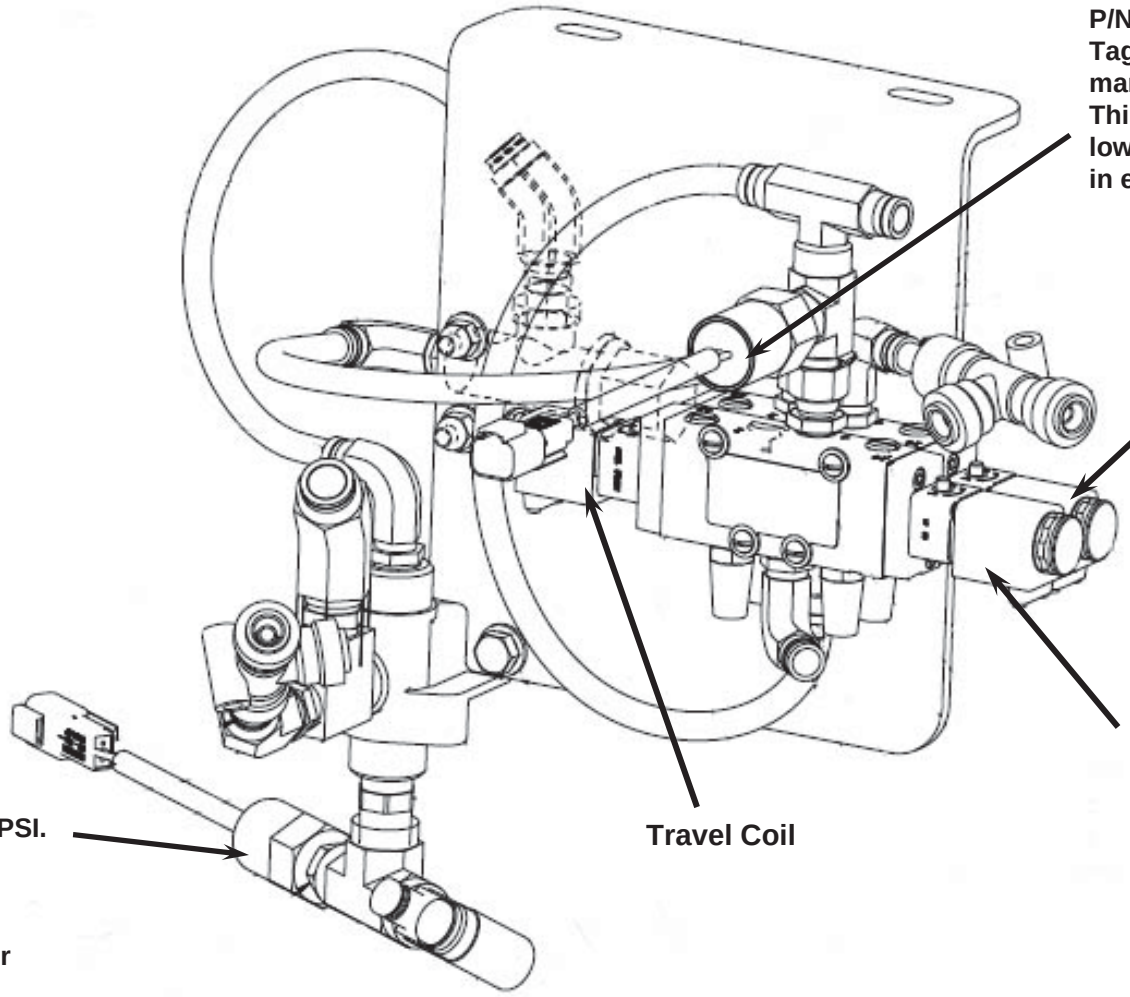
Climate control uses similar heater and AC systems as the other *GRADALL* Highway Speed machines. See XL system operation for details.

D Series uses a special Conoco oil for improved heat transfer. See operator's manual, specifications section for details.

Air System



D Series Chassis Air Valves



Pressure Switch – 70 PSI.
P/N 82173015
Tag on switch will be marked 70R
This switch is used for low air pressure warning in excavator cab.

Remote Coil

Brake Coil

Travel Coil

Pressure Switch – 35 PSI.
P/N 82173051
Tag on switch will be marked 35R
This switch is used for remote drive engage

Stabilizer Cylinders

Stabilizer cylinders are added to the Freightliner chassis to provide a locked suspension over the steer axle when digging. The cylinders and valve are similar to the components used on the XL series of machines. See XL system operation for details

Remote Steering

Remote steering is added to the Freightliner chassis. A cylinder is installed on the steering axle tie rod along with a steering valve on the chassis frame. Steering valve uses oil from the main pump to extend or retract steering cylinder. The steering cylinder works with the Freightliner provided power steering to provide remote steering.

A steer enable valve is provided in the excavator to provide a load sense signal when no functions are being used. Once the signal is generated, the steering valve then provides load sense signal to the main pump.

Steering control in the excavator is from the rocker switch on the LH joystick handle.