



Forestry
Attachment
Live Testing
Best practices

November 2022

Live Machine attachment Testing.



- First Reference all Owners and Technical manuals.
- Any machine is classed as live until all energy sources have been identified, de-activated, dissipated and isolated.
- THE TECHNICIAN IS THE PERSON CONDUCTING BUSINESS AND IS THE PERSON IN CHARGE OF THE OPERATION
- The technician must read and understand the test procedures to be carried out and use appropriate rated equipment for the tests.
- Live machine testing comes with its own particular hazards that must be identified, understood, mitigated and/or managed.

- Ensure that other personnel on the worksite are aware live testing is being carried out.
- Place a signed Live Test/Danger/Commissioning tag on carrier ignition switch.

- Tag examples:



Site assessment



- Carry out a site risk assessment, identify any possible hazards and put controls into place.
- Possible risks/hazards may include,
 - Compact/restricted worksite
 - Proximity of other machines –
 - skidders/forwarders,
 - haulers, hauler ropes/carriages,
 - trucks – reversing, off loading & hooking up trailers, loading out, chaining down,
 - sorting stacks/fleeting,
 - Surge piles (full tree stems awaiting to be processed).
 - Skid stockpiles,
 - Personnel,
 - Skiddies
 - QC
 - Other visitors, supervisors,
 - Environmental,
 - Weather,
 - Hot/cold/wet/muddy/snow/high wind/low light conditions,
 - Ground conditions, debris/slash/uneven surfaces.

Machine Assessment

Before carrying out any live testing, service technician is responsible for,

- Ensuring the condition and inspecting the machine and carrier to be repaired is safe to be worked on. This may include mechanical, electrical and hydraulic or other hazards . Do not work on machine if any hazards exist of which you are not trained to repair.
- Familiarizing themselves with the joystick configuration and operation, both attachment control and carrier function.
- Testing functionality and operation of the carrier isolation system.
- Activate carrier swing brake if not automatic.
- If carrier isolation system is not functioning correctly STOP do not proceed until this is repaired.
- If isolation system is not functioning correctly this must be rectified. Under no circumstances must the carrier isolation system be bypassed or overridden to allow testing with engine running.

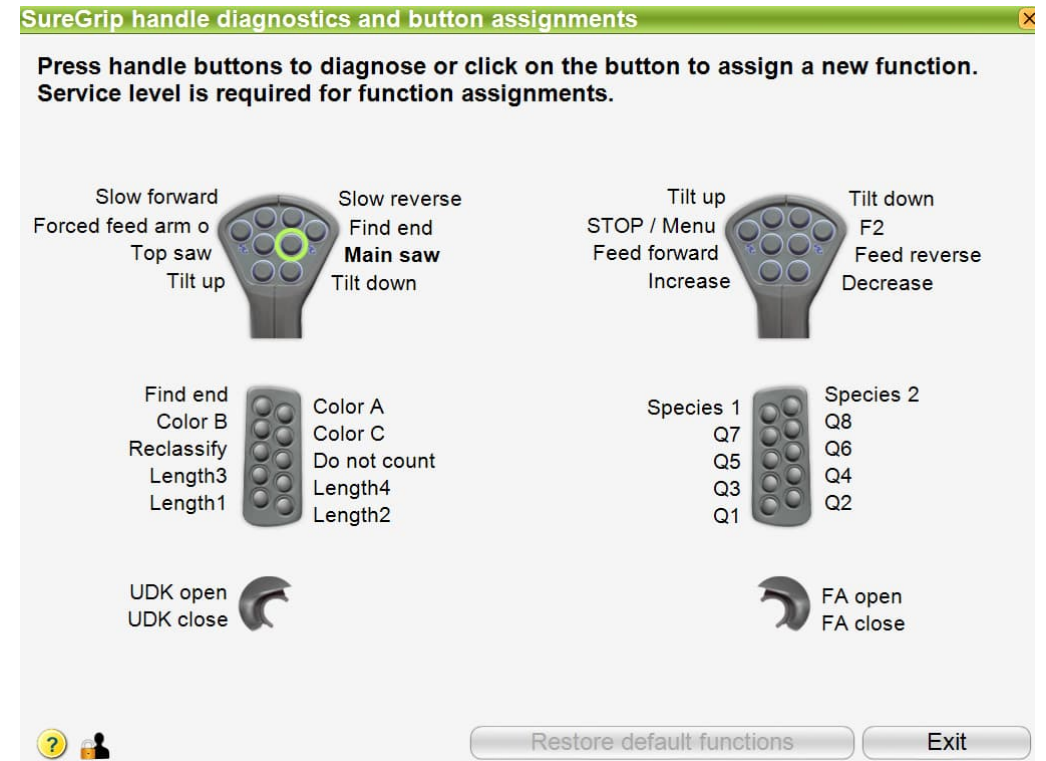
Waratah Harvester Button Position and functions.

New Zealand standard configuration with optimization shown.



- Force open feed arms – when pressed feed arms open/when released feed arms close.
- Slow forward/slow reverse – feed motors run in slow speed.
- Find end – activates find end, will feed tree in reverse to main saw.
- Top saw/main saw – activates saws, top saw may have top saw toggle set, press top saw to initiate/main saw to cut.
- Tilt up/tilt down - activates head tilt.
- Colour A,B,C - manually activates colour marking, primarily for bleeding CMS system.
- Reclassify/Do not count - do not activate a head function.
- Length 1,2,3,4 - manual log selection, will activate feed motors and close head.
- UDK open/UDK close - will activate the upper delimb function.
- May also be a lower delimb function, LDK, open/close or toggle to activate lower delimb if fitted, toggle will open LDK if closed and close if open.
- Stop/menu - will stop head function if press, press and hold to access previous menu.
- Feed forward/feed reverse – activates feed motors at full speed, can also activate auto feeding depending on controller settings
- Species – selects tree species.
- Q1-Q8 - selects start qualities and activates optimization, head will automatically feed tree to length.
- FA open/close, Head open/close – will open/close feed arms only if FA is assigned, or open/close feed arms and delimb arms if Head open/close is assigned.

F1,F2 used with other buttons to activate functions i.e., saw unjam.



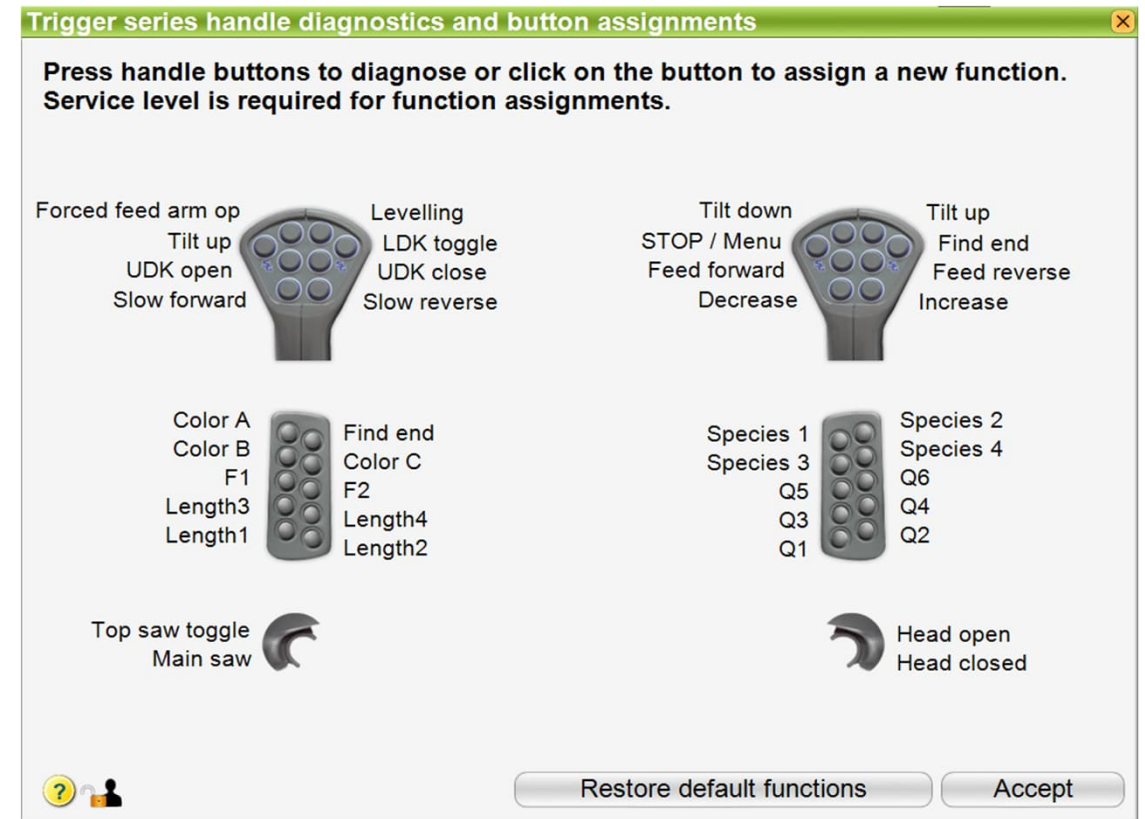
Waratah Harvester Button positions and functions.

Australian standard configuration with optimization shown.



- Force open feed arms – when pressed feed arms open/when released feed arms close.
- Slow forward/slow reverse – feed motors run in slow speed.
- Find end – activates find end, will feed tree in reverse to main saw.
- Top saw/main saw – activates saws, top saw may have top saw toggle set, press top saw to initiate/main saw to cut.
- Tilt up/tilt down - activates head tilt.
- Colour A,B,C - manually activates colour marking, primarily for bleeding CMS system.
- Reclassify/Do not count - do not activate a head function.
- Length 1,2,3,4 - manual log selection, will activate feed motors and close head.
- UDK open/UDK close - will activate the upper delimb function.
- May also be a lower delimb function, LDK, open/close or toggle to activate lower delimb if fitted, toggle will open LDK if closed and close if open.
- Levelling-activated levelling on carriers with a levelling function.
- Stop/menu, will stop head function if press, press and hold to access previous menu.
- Feed forward/feed reverse – activates feed motors at full speed, can also activate auto feeding depending on controller settings
- Species – selects tree species.
- Q1-Q8, selects start qualities and activates optimization, head will automatically feed tree to length.
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F1,F2 used with other buttons to activate functions i.e., saw unjam.



Attachment Positioning

- Position the machine to an appropriate clear area away from other objects, machines, log stacks etc.
- The attachment should be placed on level ground with the carrier boom and arm fully extended.
- Position the attachment in a suitable position for the testing process required.
- The head must be positioned to suit the individual task with the tilt frame in a suitable position to allow fitment of the locking mechanism in either the harvester up or harvester down position.
- Install safety locking mechanism to the attachment if designed, reinstall locking mechanism to attachment if it is repositioned.
- Position service vehicle in an easily accessible location and reposition as required outside of machine swing zone or work zone if live testing is required.

Testing tools and aids



- Where possible use all remote measurement devices possible for testing of hydraulic pressures and electrical signals that keep the technician a safe distance away from moving components of the attachment.
- Some tools available today are:
 - Analogue/digital gauges with 2m hose.
 - Bluetooth transducers with smartphone app.
 - TimberRite H16 onboard pressure testing function.
 - Screen sharing
 - RDA machine software
 - MTG Information

Two Person Machine Testing

- Certain tests may require a second person to operate controls and functions whilst the technician is outside the operator station.
- Using a second person increases the risk of uncontrolled/incorrect movement.
- The technician must first ensure that a competent person is familiar with these machine controls and those emergency stop procedures.
- THE SERVICE TECHNICIAN IS THE PERSON CONDUCTING BUSINESS AND IS TOTAL CONTROL OF THE TESTING PROCESS.

Machine Operator assistance

- It is vital to determine and assess the competency of the operator being used for two person testing process.
- Skill/competency of operator,
 - Do not use an operator under training, under direct supervision.
 - Utilise a Waratah technician who has been trained and has the necessary experience and confidence.
 - Confirm the machine operator is familiar with those button configuration and joystick functions.
 - Give the operator a set of instructions and then ask him/her to demonstrate they understand by doing the task.
- The machine operator must remain at the operator station to follow the operational instructions given by the technician and to activate the emergency stop should an emergency event occur.

Communication



- Ensure a positive communication method is established between the technician and the person at the operators' station before commencing any work.
- It is important that this communication is clear and precise with no chance of misinterpretation.
- Service technicians to utilize 2 hand-held two-way radio's specifically for this task and should where possible select a separate channel to avoid other voice traffic.
- Operation and function of the radio communication should be tested before use.
- When not instructed to operate controls and at completion of testing the person in the operator station is to ensure bail isolation is activated and hands are visibly removed from controls.
- Any other persons involved in the testing of the attachment must take instruction from service technician, they must be fully aware of agreed communication methods, remain in full view of the operator and the service technician supervising the test.

Working around the attachment

- As per operator's manuals, under no circumstances are any persons to enter any chainsaws, pinch and crush areas of the attachment while the engine is running, or hydraulic system live.
- All tests including sighting inspections must be performed from the ground, no climbing on the attachment.
- The technician is to ensure they and any others are clear of any attachment components or danger zones that may move/change during the test and not in the line of fire of moving machinery should an uncontrolled movement occur.
- Under no circumstances is any person to work under a suspended/raised load.
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- Care must also be taken to avoid entanglement with moving parts while the test is in progress.
- After testing is carried out the carrier engine must be shutdown, potential energy sources identified, de-activated, dissipated, isolated and appropriate lockout and tagging methods applied.

Live Electrical Functional Testing



- Reference Owners and Technical manuals.
- Engine must be shut down and carrier ignition key switch tagged.
- Procedures to be followed for machine or attachment testing that requires the electrical control system switched on with the hydraulics disabled and engine shutdown.
- Ensures only electrical energy is live. All other energy sources have been identified, de-activated, dissipated and isolated.
- Differs from live Mechanical and Hydraulic as there is lower risk for uncontrolled movement of machine or attachment as only electrical energy source is present.
- The technician must read and understand the test procedures to be carried out and use appropriate rated equipment for the tests.

Live Electrical Testing



- The procedures used for Live Machine Testing should be followed for electrical function testing.
 - Ensure that other personnel on the worksite are aware live testing is being carried out.
 - Place a signed Live Test/Danger/Commissioning tag on carrier ignition switch.
 - Site risk/hazard assessment,
 - Familiarization of joystick configuration.
 - Positioning of machine and head, use of lock pin,
 - Positioning of service vehicle,
 - Two-person testing,
 - Communication method/clarity,
 - Use of handheld radio telephones,
 - Operator skill/competency, demonstrate understanding of instructions.
 - Service technician must confirm that engine is turned off and all hydraulic energy is dissipated.
 - At the completion of testing and before any repairs are carried out the machine must be isolated and the appropriate lockout and tagging method applied.

Sensor testing DANGER

- Diagnosing the length, diameter and other sensors on all attachments is an extremely high-risk environment and dangerous undertaking.
- The location of many of these components are positioned within the direct crush zone of the forestry harvester or attachment mechanical linkages.
- There are multiple types of sensors and when interacted with during testing or diagnosing problems can cause immediate machine movement and enable automatic sequences of the attachment if the engine or powered system is still live and active.
- Do not overlook the fact that wiring failures to any of these sensors can also produce the same automatic function and sequences if the engine or powered system is live and active.
- IT IS VITAL THE MACHINE ENGINE OR POWERING SYSTEM TO THE HYDRAULIC SYSTEM IS SHUT DOWN AND INACTIVE BEFORE TESTING THESE TYPES OF COMPONENTS.
- Refer to Owner's and Technical manuals



Measuring system test procedures.



- Refer to Owner's and technical manuals



- To check condition of measuring wheel, bearing adjustment, sufficient grease, accessing encoder.
 - Stand head up, arm fully out and head lowered to ground,
 - Lock pin in,
 - Position knives/feed arms for safe access to the measuring wheel.
- Engine shut down, carrier ignition switch off and tagged, carrier master switch off if fitted,
- Joysticks and head buttons operated to ensure system is de-energized fully,
- Carry out required work.
- Where possible avoid and or minimize standing or reaching into any crush zone at all times.

Length Encoder testing Requiring Manual turning of measuring wheel



- Refer firstly to Owner's and technical manuals
- To test if encoder is counting after confirming measuring is not working in normal log measuring process.
 - Lift head off ground, tilt down to processing position,
 - Make saw cut, fully closed head – delimb arms and feed arms,
 - Fully stretch out arm and lower to ground,
 - Roll tilt frame onto back stops and install lock pin,
- Engine must be shut down; carrier ignition switch off and tagged with Do not start engine
- Joysticks and head buttons operated to ensure system is de-energized fully.
- DO NOT TURN OR MOVE MEASURING WHEEL WITH THE ENGINE POWERED. THIS WILL RESULT IN THE HARVESTER PERFORMING A CLOSE AND POSSIBLE FEEDING SEQUENCE WHICH MAY RESULT IN A CRUSHING INJURY OR DEATH.
- Rotate the measuring wheel from standing on the side of the harvester, a stick or long pole DO NOT reach into this crush area by hand.
- Where possible avoid and or minimize standing or reaching into the crush zone at all times.

Setting diameter potentiometer.



- Refer firstly to Owners and technical Manuals
- This Task requires to have someone in the cab.
 - Fully close the head, delimb and feed arms,
 - Fully stretch out arm and lower to ground,
 - Roll tilt frame onto back stops and install lock pin,
 - Engine shut down, carrier ignition switch off and tagged do not start.
 - Joysticks and head buttons operated to ensure system is de-energized fully,
 - Operator/helper to access the Waratah controller menu potentiometer setting page, follow set up method described,
 - Technician will access the potentiometer as per the appropriate CTM manual,
 - Adjust the potentiometer as required,
 - Where possible avoid and or minimize standing or reaching into the crush zone at all times.

Chainsaw proximity Sensors





- Chainsaw home and other component proximity sensors including that of linear transducers are all directly connected and capable of causing machine linkages automatically closing and or creating machine movement if engine is live.
- IT IS VITAL THE MACHINE ENGINE OR POWERING SYSTEM TO THE HYDRAULIC SYSTEM IS SHUT DOWN AND INACTIVE BEFORE TESTING THESE TYPES OF COMPONENTS.
- Where possible avoid and or minimize standing or reaching into the crush zone at all times.


Refer to owners' and technical manuals

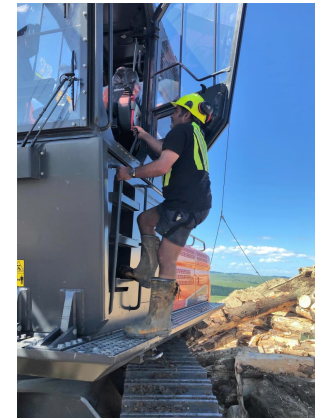


So to summarise ...

- Take responsibility for your own safety and those around you.
- Follow workplace best practice and site requirements.
- Carry out site hazard and risk assessment prior to starting work on the head.
- Use correct and current PPE.
-  Ensure good communications with the operator and others when working around the harvester – ensure the operator fully understands what is to be done and how.
- Be aware of the sharp bits – use gloves.
-  Do not go inside the head when the machine is 'live' – treat it as live.

So to summarise

- Be aware of the work environment – if needed and possible, insist the machine is moved to a safer place if possible.
-  Report any safety related issues to owner and operator and document.
- Be aware of chain shot and avoid being in the zone.
- And don't forget about maintaining three
 - points of contact when climbing onto and
 - off a machine.
- Beware Carrier machines may be set up for other joystick patterns.
- Beware of possible boom drift.



Disclaimer: Waratah Forestry



- This training program is only intended to highlight key Safety areas and scenarios when live testing and working on and around forestry attachments
- It is not an all-inclusive training program for all machine attachment maintenance and diagnosing
- Please refer to specific Product Owner's manuals for further practices and procedures.
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