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1  INTRODUCTION

Congratulations on your choice of control system! **motomit IT** is a third generation harvester data system developed on the sound basis of its predecessors. Combined in it are the latest technology in the field, top efficiency, reliability and easiness of use. It has been designed in co-operation with both forestry professionals and harvester manufacturers. We hope that this manual will enable you to get the most out of the **motomit IT** system. By reading this manual carefully, you will be able to take advantage of the superior features of **motomit IT**. Since the basics of controlling the harvester head haven’t changed, you can make use of the **motomit 4** manual in addition to this one.

**motomit IT** optimising and control system divides and optimises the stem effectively using intelligent prognosis. Scaling and optimising based on StanForD and HKS-standards guarantees excellent productivity to satisfy the contractor, forest owner and the forest company. By adding satellite navigation and data transfer to the **motomit IT** system, accurate control of harvesting and reporting between the harvester and the forest company is possible.

Superior features of **motomit IT**

- Optimisation at high computing speed
- Data transfer according to StanForD-standard
- HKS approved
- Renewed test diagnostics
- Smaller and more efficient harvester head module
- Linux operating system

**Safety**

**motomit IT** system is designed to operate in a safe manner and it has many built-in security structures. To maintain maximum safety, always take care of the following things during the operation and service:

- Installation and start-up of a **motomit IT**-system should be carried out in co-operation with a retailer’s service person trained and authorised by Mitron. The operator should also receive training on how to use the system.
- Whenever you switch the power to **motomit IT** ON or OFF, make sure there is no-one close to the harvester.
- Always make sure there is no-one inside the boom / harvester head risk-zone when operating with the machine.
- Whenever you work on the harvester head, switch the power from **motomit IT** system OFF.
- Before you weld something on the harvester, unplug all connectors from the harvester head module MCC and the interface module MCI.
2 BASIC FUNCTIONS AND SYSTEM STRUCTURE

2.1 motomit IT modules

motomit IT is a four-wire system, based on CAN (Controller Area Network). CAN bus is intended for demanding applications and circumstances under heavy interference. Intelligent control functions are distributed between:

- harvester head module MCC (Mitron CAN Controller),
- display module MCT (Mitron CAN Terminal) or processing module MCTB in motomit PC
- keyboard control module MCKC (Mitron CAN Keyboard Controller).

These modules are connected to each other by two CAN signals, supply voltage (VCC) and ground (GND) wires. Voltage wires are doubled to ensure maximum reliability and power capacity. Therefore a CAN cable from the cabin to the harvester head has 6 wires and a shield.

In addition to these three modules there is an interface module MCI (Mitron CAN Interface) which makes installation in the cab easy and quick. MCT display module controls the MCI module. Supply voltage from the base machine is connected to the MCI module and distributed again to the other parts of the system. MCI has pump control signals for the base machine. In addition there are also connectors for a thermal printer and callipers.

Handle keys and preset keyboards are connected directly to the MCKC module, which transfers the button signals through the CAN bus to the other modules. Since these modules are compatible with the older ones, motomit 4 can be upgraded to IT by changing only the display module. In case of motomit PC model, it is recommended to replace also the MCI module with the new one.

PC model has a separate processing module instead of a display module. Cable to the PC is connected between the communication ports of the PC and the MCI module of motomit.

See the system structure and modules in the following picture.
2.2 **motomit IT display**

- Measured length in centimeters and diameter in millimeters.
- Selected species and product.
- Preset length and minimum diameter.
- Profile of the scaled stem.
- Message field.
- Cutting area, operator, stem counters, date and time.

**Buttons:**

- **ESC**-key on the left side of the panel. Used for moving backwards in the menu, returning to the main window and as a cancel-key.

- **MENU**-key. Used for moving in the menu and within the editable fields. After pressing ENTER, you can change any value or function or write text by pressing this key. Contrast of the display can be adjusted with MENU-key LEFT / RIGHT when the main window is visible.

- **ENTER**-key on the right side of the panel. By pressing this in the main window you get to the main menu. When you wish to change any value on the display, press ENTER, select or type the value by using MENU-key and validate the change by pressing ENTER again. Change can be cancelled with ESC-key unless you haven’t pressed ENTER.
3 USAGE / OPERATION

3.1 Menu structure

A press of ENTER in the main window takes you to the main menu.

Move between the main menu topics with MENU-key and select one with ENTER. ESC takes you back to the main display.

"Menu tree" on the left and caption on top of each window show which window is open. MENU-RIGHT or ENTER on top of a Main topic opens the branch and shows the list of submenus of which you have to select one with ENTER to open the window.

This manual covers some things about optimisation, autocalibration and data transfer which do not belong to all program versions. There is more about them in Additional properties manual. Ask for available versions from your dealer.
3.2 Changing a value on the screen

The following applies to all of the changes:

Red colour indicates where the cursor is, i.e. which editable field or other component is active. A press of
ENTER turns the background of the field into yellow if you are allowed to change the value. Field being yellow,
change the value with MENU-key and accept the change with a press of ENTER or cancel with ESC. If the field is
grey, the setting is not in use or it is otherwise disabled (low userlevel).

**Numeric value**

MENU-UP / DOWN increases / decreases the value by 1. MENU-LEFT / RIGHT changes the value by 10. By holding UP
/DOWN pressed, numbers start to roll faster.

**motomit PC:**

You can use normal PC keyboard and arrow keys. Backspace removes previous numbers on a numeric setting field.

You can set the value to the minimum value by pressing minus. Caps Lock button is not in use. Press Shift when typing
in capitals.

**Text field**

You can find all of the characters and numbers under MENU-UP / DOWN. Type the text one character at the time. When
the correct letter is blinking, press MENU-RIGHT once to add another etc. Press ENTER only when the last letter of the
text is blinking. The field can be cleared first by holding MENU-LEFT pressed.

**motomit PC:**

Caps Lock button is not in use. Press Shift when typing in capitals.

**Listbox**

Select the option from the list with MENU-UP / DOWN.

**Checkboxes** are used when the setting can be either ON or OFF and also if many options can be selected at the same
time.

- Checked = setting is ON
- Unchecked = setting is OFF

**Command buttons**

**Next window.** A press of ENTER on this button takes you forward to another window under the same
submenu. ESC takes you back to the previous window.

**OK** A press of ENTER on this button executes the function in question.
4 START-UP PROCEDURE

When a new system is installed or motomit 4 upgraded to motomit IT, this start-up procedure should be carried out in order to get the measuring device into use in most efficient and reliable way.

1. BASIC SETTINGS
   > Maintenance > Start-up
   • Language
   • Harvester head type
   • Volume calculation method
   • Load factory settings and basic calibration values
   • Hydraulic valve block

2. TEST HARVESTER HEAD FUNCTIONS
   • Remember the safety aspects

3. BASIC CALIBRATION
   • Basic length calibration
     > Calibration > Basic length calibration
   • Basic diameter calibration
     > Calibration > Basic diameter calibration

4. PROGRAM PRODUCT TYPES AND PRESETS
   • Change species information if necessary
     > Scaling > Tree species
   • Edit the preset table
     > Scaling > Presets
   • Program the additional keys as desired
     > Scaling > Keyboards

5. ADJUST FEEDING PARAMETERS AND HEAD FUNCTIONS
   • Harvest some trees
     > Settings . . .

6. CALIBRATION PER SPECIES
   • Calibration of length measurement
     > Calibration > Length
   • Calibration of diameter measurement
     > Calibration > Diameter

7. CUTTING AREA INFORMATION
   • Cutting area information
     > Scaling > Identification
   • Operator & machine information
     > Settings > Machine, Operator

8. OPERATOR’S TRAINING

9. START THE PRODUCTION
   • Choose Cutting area (1, 2, 3 or 4)
     > Scaling > Identification ... Cutting area
   • Reset Cutting area before starting production
     > Maintenance > Resets
5 OPERATION

5.1 Starting a new cutting area

When you start a new Cutting area (Memory bank in motomit 4) the following things should be done:

- Select a new Cutting area, 1, 2, 3 or 4. > Scaling > Identification ... Cutting area
  or reset the current Cutting area: > Maintenance > Resets
- Edit the preset table and product type settings > Scaling > Presets
- Set Cutting area and contract information > Scaling > Identification
- Check the calibration, make a control measurement > Calibration > . . .

5.2 Start / end a work shift

At the start of a work shift:

- Select the operator if necessary > Settings > Operator
- Select the cutting area if necessary > Scaling > Identification
- Check the calibration (make a control measurement) > Calibration > . . .

At the end of a work shift:

- print out or write down your working hours and harvested timber volume

5.3 Finishing a cutting area

At the end of a cutting area:

- print out the harvested timber volume - measurement proof
- save PRD if necessary
5.4 Changing species and blocks

Changes can be made before finishing the stem. You can handle all functions by preset keys.
Program a button SHIFT. That function works when the main screen is on. First press sets the SHIFT mode on and there shows SHIFT text on a red background. Second press sets the SHIFT mode off.

5.4.1 Cutted blocks

Press shortly ARROW DOWN or press SHIFT for two seconds. If there are any cutted pieces and the stem is not finished yet, the screen shows a list of the blocks. Last cutted block is the first row and the first block of the stem is in the last row as number 1. Screen shows cutted length, top diameter and volume in dm3.

5.4.2 Changing species

Example. You have cut some Spruce blocks and want to change the species of the stem to Pine.

Press once SHIFT and then SPECIES 2 (PINE) button. Screen shows a suggestion how to change the products.

You can move in the screen with arrow buttons or preset keys.
APT+ or UP = ARROW UP
APT- or DOWN = ARROW DOWN
SHIFT = ENTER

Accept the change with SHIFT or ENTER. ESC cancels it.
5.4.3 Changing a block

Example 1. Last cutted block was made as LOG and you want to change it to PULP.
Press once SHIFT and then whatever preset key that would select a PULP. LOG is changed to PULP. Press SHIFT.

Example 2. You have made several blocks and you wish to change one of the LOGs to PULP.
Open Cutted blocks -screen.
Move down on the row that you want to change. Press SHIFT.
Select PULP from the list and press SHIFT.
The list shows only those products to which it is possible to change the block. E.g if you cut a pulp wit a small diameter, there won't be any log products in the list.
The block is changed to PULP.
Move up to OK-button and press SHIFT.
5.5 Harvesting

Some special situations and how to handle them.

5.5.1 Forked trees and big branches
Process the stem after cutting off the forks separately. Pick another fork; press NEW STEM button and process normally.

5.5.2 Squaring the butt
If the butt needs to be squared, simply cut off a short piece, less than 1.5m. A message “DEVALUATION OF PIECE” appears on the display. The piece is added to the “REJECT” counters. This counter can be printed out in the Assortment report, otherwise it won’t appear in any other production data.

5.5.3 Wind throws
If the tree is already felled, then do the following to start processing, unless there is a setting called Processor. Grab a tree, and feed up to bar or square the butt. Press NEW STEM key. Continue processing as normal.
If trees to be processed are already felled, set tilt mode (Settings > Tilt) to ONLY CONFIRM and the head will not tilt up when the button is pressed. The tilt up button now just finishes the previous tree and increases the corresponding counters. Alternatively you can press NEW STEM button after each stem.

5.5.4 Free length pulp
Set setting Stopping to TOP for pulp (Scaling > Presets ... Product types ..). Program at least two presets; the shortest and the longest allowed length. Feeding stops either at the preset length or at the minimum diameter depending on which is reached first. If Stopping was set set to ADVANCE, the head would reverse to the next shorter length when minimum diameter is reached.

5.5.5 Knot backing
You can use automatic knot backing by setting the parameters ‘Knot backing distance’ (Settings > Other) and ‘Fast backing distance’ (Settings > Other). The values should be such that the mass of the stem is exploited with small and fast movements. With most head types the head reverses three times before stopping if the knot is not passed (Automatic knot backing).

5.5.6 Processing
(Some harvester heads) Used when the head is used as a processor with a photocell. Grab a felled tree and push NEW STEM -key. The harvester head reverses towards the butt end of the stem until the photocell tells motomit to stop feeding. motomit resets the length and starts to feed forward to chosen preset length.
5.6 Messages on the display

Message row on the main screen shows information about some functions.

LOG AMOUNT FULL
More than 60000 logs with the same length/diam. combination. Save production, change / reset the Cutting area.

NO SCALING MEAS.
There is not any preset that motomit could select. May be limited by min and max butt and top diameters or some product settings.

MINIMUM DIAMETER
Diam. below preset minimum. Choose a smaller block if there is one.

NOT IN SAWING AREA
Head has stopped outside the cutting window. Check the size of the cutting window, adjust feeding parameters.

STEM NOT READY
Can't change the cutting area if the stem is not finished.
Use SHIFT function to change species.

NO MOVEMENT
Head has not enough power to feed or length sensor is broken.

CHOOSE SPECIES
If Settings - Feeding ... Forcing to choose species is ON, you must press species key before the feeding starts.

STEM DID NOT FALL!
Not proper felling cut made.

SAW DID NOT MOVE
State of the Saw home sensor didn't change when sawing.

DEVALUATION OF PIECE
Shorter than 1.5 m block is rejected.

REJECT MISSING
There must be a reject product for all species. Otherwise small pieces are registered under a wrong product.

MAX STEM LENGTH
Max stem length is 50 m.

NO CHANGE LAST BLOCK
The block could not be changed or there are no pieces made.

LAST BLOCK CHANGED
The block was changed to another product.

GRAPPLE WAS OPENED
Head was opened during feeding.

KNOT BACKING
Feeding is active but length sensor doesn't give pulses. Knot backing is activated.

CONTROL MEASURING
Control measuring interval is reached. Make diam / length calibration.
CONNECTION FAULT / Head power off
No CAN signal to the head module. System cuts power off from head module and keyboard module. See service manual.

SHORTCIRC./CABERLBR.
Wiring fault.

EEPROM COPY FAULT
Different cabin and head program versions. Bad wiring.

DIAM. DROPPED >2cm
Diameter dropped more than 2 cm in 10 cm length.

CUTTING AREA CHANGED
Cutting area changed with programmable keys.

DIAMETER FAULT
Head open - close values differ from the previous values. Check wiring and mechanical mounting of the diameter sensor.
6 SCALING

6.1 Presets

You can set a total of 100 presets per tree species.

Select > Scaling > Presets. All of the preset settings can be set through this preset table.

Tree species:
Choose the species from the list. Each species has its own preset table of 100 rows.

Columns in the preset table:

#
Number of the product (1…20).

Product type
Product type of the preset in the current row.

Length
Preset length in centimeters.

Min. diameter
Minimum top end diameter of the preset in millimeters.

Max. diameter
Maximum top end diameter of the preset in millimeters.
A press of ENTER at the **Max.Diam** column, opens a window where you can set Max- and Min butt diameters for the preset.

![Max.Diam Table](image)

All diam limits are per preset.

Return with ESC key.

**Copy OK** sets the value to all presets of the product type.

Settings for the Product types can be changed in another window by pressing ENTER in the Product type column of the preset table. If you wish to go to the LOG settings, select any row in the table where the product type is LOG and press ENTER. *motomit* initialises the table with LOG presets (340 – 580cm), 200cm ROT and 300cm and 500cm PULP. REJECT is the last one in the table. Reject is needed in order to save the volume of the short pieces cut for example when squaring the butt so that they are not added into the log counters. Do not remove it.

### 6.1.1 Product types

![Product Types Window](image)

- **Product**
  - Number of the product and a field where the name can be written. Below the name field there is a list of common product names so that you don’t necessarily have to write the name.

- **Code**
  - Product type code of a forest company.

- **Qualities**
  - Even when not using value or quality scaling, at least one of the checkboxes must be ticked. Otherwise the product is disabled from use. In C and E versions this setting is simply **Product in use**.
Colour
Colour for automatic colour marking. Three spray nozzles can be controlled in the head.

X X X = Colour 1
X X = Colours 1 and 2

Squares on the main screen show the dye marking selection.

[ ] [ ] Colour 1 (red)
[ ] [ ] Colour 2 (blue)
[ ] [ ] Colour 1 & 2
[ ] [ ] Colour 3 / urea (yellow)

Sound
Sound signal, when a block of this product type has stopped inside the cutting window. Length of the signal can be adjusted between 0 – 9. 0 = no sound, 9 = 0.5 s long sound.

Cutting window
Allowed lower and upper limits for the cutting tolerance per product type.
E.g. preset SPRUCE LOG 400cm

Cutting window: Bucking length

<table>
<thead>
<tr>
<th>Lower Limit</th>
<th>Upper Limit</th>
<th>Cutting Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 mm</td>
<td>50 mm</td>
<td>400 – 405 cm</td>
</tr>
<tr>
<td>-30 mm</td>
<td>30 mm</td>
<td>397 – 403 cm</td>
</tr>
<tr>
<td>30 mm</td>
<td>80 mm</td>
<td>403 – 408 cm</td>
</tr>
</tbody>
</table>

*) Don’t forget the minus sign, when needed. If both of the limits are set to same value, the cutting window is 0 mm and it is impossible for the head to find the length. motomit gives a message on the screen in that case.

Product type group
LOG, POLE, PULP, ROT or REJECT. Affects on piece counters, printouts and value scaling. ROT and REJECT are not taken into account in value scaling. Logs are grouped in the log list by the top end diameter. Poles are grouped by the mean diameter of the piece. Reject pieces are not added to the total counters, but they can be printed out separately.

Product type group can not be changed in the middle of harvesting.

Stopping
ADVANCE = The head is fed directly to the desired length. If the minimum diameter is reached, the head reverses to the next shorter length if possible (No free length).

OVERRUN = The head is fed past the preset length at the amount of Overrun distance (Settings > Other) and reversed to the cutting window. Makes it easier to start feeding the next block.

TOP = Feeding stops either at the preset length or at the minimum diameter depending on which is reached first (Free length).

TOP2 = Like TOP but used in value scaling if there are restricted dimensions. Feeds to the minimum of the diameter class.
### 6.1.2 How to add a new preset

Adding a preset for an existing product type:

**Example.** Adding preset 450 cm PINE PULP.

1. Open menu > Scaling > Presets and select PINE.
2. Move down to the empty row that is under the last pulp preset. Press ENTER on **Length** column.
3. A new preset appears on the row. Change the length to 450. Another empty row appears below so you can add the next preset in the same way.
4. When you have changed the length to 450 and pressed ENTER, the presets are arranged into length order.
6.1.3 How to remove a preset

Preset can be removed if there are no pieces in the counters.

Example. Remove preset 370 cm PINE LOG.

Press ENTER in the Product type column on that preset row you wish to remove.

Select Product 0 (Not in use). Press ENTER and then back to the preset table with ESC.

Accept the change with ENTER.

The preset is removed. Presets are always shown in length order.

Another way to remove a preset is to set 0 for length. In PC-model press ENTER, minus and ENTER.

You can disable a preset at any time by setting so big min top diameter for the preset that it is not possible for the head to make it.
6.1.4 How to add a new product type

Example. Add presets 310 cm and 370 cm for PINE SMALL LOG.

Go to the preset table window and choose the tree species.

Move down to the first empty row in the table, and press ENTER in the Product type column.

Select the first empty entry from the Product list.

Type the name for it in the field below the list.

Tick Product in use (in J-program at least one of the Quality checkboxes), select Product type group and check all of the other settings in the window. Press ESC to get back to the preset table.

Set length and min diameter for this new preset. Add other presets like in the chapter How to add a new preset.
6.1.5 How to remove a product type

The easiest way to disable a product is to set Product in use OFF (in J-program take all qualities off). Single presets can be disabled by setting a large min diameter.

If you want to remove the product so that it won't appear in any printouts, remove all presets like in the chapter How to remove a preset. You can't remove the last preset if the cutting area is started.

6.1.6 How to change the min top diameter

Example. Change min diam of PINE LOG from 160 to 150 mm.

Press ENTER in the Max. diameter column on any LOG row.

Set top min 150 mm and press Copy OK.

Here you can change also the minimum and maximum diameters for butt of the piece in addition to top diameters.

If you want to change values of a single preset, make a change and return with ESC.
6.2 Diameter classes

Classes can be edited if there are no harvested pieces for the product. Classes must be in ascending order.

Go to product settings and then press Next page >>

You can browse all matrices of the species in this window. Top row shows presets and the first column diameter classes.

Example. Matrice of PINE LOG.

150 mm. First diameter class = Minimum diameter of the product.

220 mm. Last diameter class.

300 mm. = Maximum diameter of the product.

1400 mm. First figure after the maximum diameter, class not in use.

3000 cm. Last figure after the longest preset = Maximum length of the product.

Note that free length pulp can be made up to its maximum length.
6.2.1 How to add diameter classes

Edit 1400 that is the first figure after the maximum diameter.

Class 300 in use. Max diameter changed to 400 mm.

6.2.2 How to remove diameter classes

Start from the bottom (max)

Class 220 removed. New max diam is 220 mm.
6.3 Colour matrix

Go to product settings and then press Next page >>

It is possible to mark only certain lengths or dimensions.
1 = Colour 1
2 = Colour 2
3 = Colour 1 and 2

Colour marking selection per whole product type works over this matrix, so do not tick any checkboxes if you want to use marking for certain dimensions.

Settings > Colour/Lubric. ... Automatic colour marking must be ON to make colour marking work.

Example 1. Set colour 2 to 400 cm PINE LOG.

Press ENTER at 400.

Set diameter range if needed.
Set colour 2 and press OK.
Example 2. Colour marking for PINE LOGs that have more than 200 mm top diameter.

Press Enter on top left corner.

Presets / Diameter
Lower and upper limits for the range that the value will be set. In this case all presets and diameters starting from 200.
6.4 Tree species

**motomit IT** has 4 predefined tree species:

- **SPECIES1** = **SPRUCE**
- **SPECIES2** = **PINE**
- **SPECIES3** = **BIRCH**
- **SPECIES4** = **ASPEN**

Do not change the order. **motomit** takes care of the order in data transfer.

Number in front of the name selects the species. Below the name there is a list of common names.

**First preset**

The number in the preset table for the length which is automatically chosen after felling a tree when value scaling is not in use.

**Stump treatment**

ON = urea is automatically sprayed onto each butt when felling a tree of this species.

**Butt**

Multiplier table of the butt curve can be chosen from a straight line (cone), spruce, pine or broadleaf tree. This information is used only when the volume of the butt - distance from the saw bar to the first real diameter measure - is calculated. The actual butt curve can not be edited.

**Bark parameters**

The meaning of the bark parameters depend on the Volume calculation method.

Bark parameters are not (visible) used on Volume calculation method SLICE BY SLICE.
6.5 Keyboards

Programming the keys:

Press the preset key you want to program. The name of the key is the same that the name of the pin to which it is connected in the MCKC-module. Select the desired Function from the list.

6.5.1 Preset selection

PRESET 1 – PRESET 10 – keys are for direct preset selection. PRESET 2 doesn’t mean that it would select the preset #2. When the function PRESET 1 … PRESET 10 has been assigned to the key, you will be able to select any preset number from 1 to 100 per tree species.

First program function PRESET 1 - 10. Move down to Function frame and set preset per tree species. First row is for TREE 1, second for TREE 2 and so on.

Program different PRESET number for the next key and set desired presets like before. Repeat this for all of the keys that you want to use for direct preset selection.

This programming won’t be reset in any situation. motomit remembers the number of the preset in the preset table.

Check the programming after loading a new APT file.
6.5.2 Functions for the preset keys

<table>
<thead>
<tr>
<th>Key Code</th>
<th>Function Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>--</td>
<td>no function</td>
</tr>
<tr>
<td>SPECIES1 - SPECIES4</td>
<td>species selection. SPECIES1 = Spruce, SPECIES2 = Pine ...</td>
</tr>
<tr>
<td>SPECIES5 - SPECIES9</td>
<td>not in use</td>
</tr>
<tr>
<td>LOG, POLE, PULP, ROT, REJECT</td>
<td>product selection according to the product type group</td>
</tr>
<tr>
<td>UP, DOWN</td>
<td>longer / shorter preset from the selected length</td>
</tr>
<tr>
<td>PRESET 1 – PRESET 10</td>
<td>key for choosing directly any preset per species</td>
</tr>
<tr>
<td>CORR.</td>
<td>manual correction for colour marking</td>
</tr>
<tr>
<td>COLOUR 1 – COLOUR 3</td>
<td>colour selection for manual or test spraying</td>
</tr>
<tr>
<td>COL. TEST</td>
<td>used for testing colour spraying after the colour selection</td>
</tr>
<tr>
<td>NEAREST</td>
<td>selects the closest preset during the feeding</td>
</tr>
<tr>
<td>PROD.1 - PROD 9</td>
<td>product type selection</td>
</tr>
<tr>
<td>PROD.+/PROD.</td>
<td>next / previous product type selection</td>
</tr>
<tr>
<td>RESET</td>
<td>zeros the measured length</td>
</tr>
<tr>
<td>UREA</td>
<td>manual selection for urea spraying</td>
</tr>
<tr>
<td>KNIFEOP</td>
<td>knives open pulse</td>
</tr>
<tr>
<td>MB 1 - MB 2</td>
<td>cutting area (memory bank) selection</td>
</tr>
<tr>
<td>PRESET +, PRESET -</td>
<td>longer / shorter preset from the current length</td>
</tr>
<tr>
<td>MB + / MB -</td>
<td>cutting area (memory bank) selection + and -</td>
</tr>
<tr>
<td>LANG.+ / LANG.-</td>
<td>not in use (language selection by + and -)</td>
</tr>
<tr>
<td>NEW STEM</td>
<td>starts a new stem</td>
</tr>
<tr>
<td>Q1...Q8</td>
<td>quality selection</td>
</tr>
<tr>
<td>BUTT</td>
<td>short reverse to clear the butt</td>
</tr>
</tbody>
</table>

6.5.3 Use of some preset keys

LOG, POLE, PULP, ROT, REJECT

Product selection according to the setting > Scaling > Product types ... Product type group.
Example: If you press a PULP key, computer selects the first possible preset that has this Product type group. If you wish to select a certain preset from a certain product, use APT keys instead.

UP, DOWN, PRESET + PRESET -

UP and DOWN functions select the next preset from that preset which is on the screen.
PRESET + and PRESET - functions select the next preset from the currently fed length.

Example 1:
Fed length = 700 cm, automatic scaling shows preset 430 on the screen.
A press of a DOWN key makes it to feed to the next shorter preset from 430.
A press of a PRESET - key makes it to feed to the next shorter preset from 700 cm.

Example 2:
Fed length = 200 cm, automatic scaling shows preset 430 on the screen.
A press of a UP key makes it to feed to the next longer preset from 430.
A press of a PRESET + key makes it to feed to the next longer preset from 200 cm. If there are no shorter
presets than 200 cm, PRESET - key also starts finding the next longer preset from 200 cm.

**motomit** selects the next possible preset and jumps past those presets which have diameter or other limits.

**COL.TEST**
Example how to test the Colour 1 output:
Program functions COLOUR1 and COL.TEST to the keys. Set Settings > Colour/lubric. . . Colour spraying time.
Press COLOUR1. A small square on the main screen turns into red. A press of COL.TEST activates the colour
output. Press repeatedly if you wish to get rid of air in the system. You can test UREA in a same way with the
COL.TEST key.

### 6.6 Changing the cutting area

This is where you can change the active Cutting area.
Cutting area is a memory bank where all of the production
data - harvested timber volume - is stored. **motomit IT**
can handle four Cutting areas at the same time. Cutting
areas are numbered from 1 to 4.

Information on the Cutting area depends on the forest
company and usually comes from an APT-file.
Upper >> -button opens the site information pages.

Lower >> -button opens a page for taking an APT file into use (E and J versions).

**Cutting area status**
- **STARTED** Pieces made.
- **RESET** Pieces not made. Resetting the cutting area resets the production and site information. Doesn't reset any
  presets.
- **INTERRUPTED** PRD saved and marked that Cutting area is not finished.

**Production**
Start date of the site.

**APT:**
Name of the apt file that is in use.
Changing the cutting area may take a few seconds as the system loads all the required preset settings. Programmable buttons MB+ ja MB− change the area when the main screen is on.

There is no need to select the cutting area when starting a new site if you use only one memory bank.

### 6.6.1 Site information

Site information used by the forest companies.

![Site information screen](image)

**Main species**

This species is selected automatically after each stem finished. Otherwise the previously selected species will remain on the screen. **Not in use** turns the main species selection OFF and holds the previously selected species for the next stem.

**Control measuring interval**

0 - 1000m³

Gives a message on the screen every time when this volume is reached to remind the operator to do the calibration. The message will disappear only when the calibration is done.
7 MAINTENANCE

7.1 Start-up

User level  BASIC, STANDARD, ADVANCED, SPECIAL

Password field. List of levels.
You can always browse through all windows and see what settings are on. On lower userlevel there are less settings that you can change. Light grey text means that the setting is disabled on the current userlevel.

Measuring unit  METRE / INCH

Measured diameter and length values on the display can be changed to inches. All the preset settings etc. are always in metrics.

Printer

Restart the system after changing the printer type. motomit PC supports A4 printer which is connected to the PC. Select printer type WINDOWS for the A4 printer. Select Scriptos if you have Kyosha thermal printer.
Volume calculation method

Before changing the Volume calculation method, reset the Cutting area (> Maintenance > Resets). Volume calculation method cannot be changed in the middle of the cutting area. There are three methods for calculating the volume of timber.

SLICE BY SLICE

Volume is measured in 10 cm cylindrical slices. Diameter is the average diameter of a slice on bark and length the actual cut length. Total volume is the sum of the slices. Standard method in Finland.

SLICE BY SLICE UNDER BARK

Similar to SLICE BY SLICE method but the bark reduction is made before the volume calculation. Diameter on the screen and in the printouts is always on bark. Standard method in Sweden.

HKS UNDER BARK (German fast meter)

The volume of a log is measured as a cylinder, diameter being the median diameter under bark and length being the nominal length, which is shorter than the cut length. Difference between the nominal length and the cut length should be made by shifting the cutting window wholly to the positive side, for example from +120mm to +170mm.
Load default (factory) settings

Harvesting head

Default values for the head type: operating modes, feeding, tilt, etc.

Default keyboard layouts

Default programming for the preset keys.

Calibrations

Sets the same diameter calibration curve for all species.

Tick checkboxes and press OK. At the start-up of a new head it is recommended to load all default settings. These settings can also be copied from another motomit as a MAS file.

NOTE! After loading the Calibrations, check Measuring wheel diameter and Pulses/revolution in the window > Calibrations > Basic len.

7.2 Date and time

Language

FINNISH, SWEDISH, ENGLISH, GERMAN, FRENCH, SPANISH, PORTUGUESE, RUSSIAN, CHECH

Language can be changed at any time. Doesn’t change the names of the tree species or products or any other information that can be user-defined. Initialize products / species to get their names in selected language (Maintenance > Resets ... Initialize).

Character set

Changes the list of available characters when typing with arrow buttons. Doesn’t change the appearance of the other texts on the screen.

Western

Normal western alphabet.

Cyrillic

Cyrillic characters. Select when russian language is used.
Measuring unit  METRE / INCH

Measured diameter and length values on the display can be changed to inches. All the preset settings etc. are always in metrics.

Kello/pvm

Save date OK saves adjusted date and / or time.

7.2.1  Russian language in motomit PC

If the screen looks like this after changing the language to russian:
Select  File - Codepage ...

**cp1251**  Cyrillic. Select this and restart motomitPC Windows program.

**cp1252**  Western.

Scriptos / Kyosha printer turns automatically to graphic mode when printing special characters. It is slower than normal to take reports in russian language.
7.3 Test diagnostics

In the test display you can test functions of all of the keys, pump controls, inputs and outputs of the head module. Numbered squares indicate connector pins of the head module. Same numbering is in the circuit diagrams and also printed on the module. Colour indication:

- Black = ground
- White = inactive
- Green = active output or state of a limit sensor

CAN connection to the head module must work.

7.3.1 Sensors

Find out the type of sensors in your harvester head. motomit is able to read length and diameter signal from both pulse sensors and potentiometers. Numbers of pulses are shown as pulse edges. One pulse consists of four edges. E.g. sensor of 100 pulses gives number 400 to the screen from one rotation.

Pulses on top left corner:
1 = length (all heads)
2 = diameter sensor 1
3 = diameter- or length sensor 2
4 = saw pulses

Relative mV values from potentiometers
AD on lower left corner:
1 = diam potentiometer 1
2 = diam potentiometer 2

Limit sensors
PIN 46 = saw home sensor (all heads)
PIN 47 = limit sensor (some heads)

Current length and diameter are in the test display to help you harvest trees while troubleshooting.
7.3.2 Keys

Frame on top right shows which buttons are being pressed and which head module outputs are active.

Programmable keys:
< There is one button being pressed which is connected to PIN LEFT 2.1 in MCKC module. Programmed function is SPECIES 2 (PINE).

If there doesn’t appear any text while pressing a button, there is something wrong in the button or in its wiring.

Handle keys:
< There is a button being pressed which is connected to PIN R5 in MCKC module. Function of the button is SAW.
There are three active outputs. E.g.
DO20 26 FKNIVECL = Digital Output 20, nr 26 by running numbering. Function = Front knives close.
Output pin nr 26 is green.

< HEAD OPEN button is being pressed. There are three active outputs in the head module.
7.3.3 Pumps

Base machine pump controls from MCI module appear as green bars and percent values. P1 = PUMP 1 and so on.

7.4 Resets

7.4.1 Resetting the Cutting area

Resetting the Cutting area deletes the produced volume from the counters and resets identification and contract information.

Select Cutting area from the list. Give the number of the Cutting area you wish to reset.

Press Reset OK.

7.4.2 Others

Depending on the choice you will be able to reset or init.

Tree species
Sets names and other start-up values for the species; SPRUCE, PINE, BIRCH and ASPEN.

Product types
Reset - Clears all of the product type information
Init - Initialises values for LOG, PULP, ROT and REJECT

Presets
Reset – Clears the preset tables
Init – Clears the preset tables and initialises them with the basic presets
Price lists
Sets basic price for the price lists.

Auxiliary memory
Resets the temporary memory where the data of the latest pieces is stored. Reset this before making an auto calibration.

Stem profile
Sets factory values for the stem profiles.

Working hours
Resets work hours and production counters from the currently selected operator / active cutting area.
For monitoring working time and production, IT has stem and m3 counters / tree species / operator / cutting area.
In addition there are working time counters / operator / cutting area. These counters can be reset at any time without affecting to the main production counters. There is a message dialog on the screen that tells the selected operator and active cutting area. Resetting the cutting area resets work hours and stem and volume counters from the active cutting area / all operators.

Error codes
Error codes can be printed out to help troubleshooting. Resetting them makes it easier to monitor the most recent malfunctions.

All
All memory reset should be done always after loading a new cabin program in. As it initializes the new program for use, it resets all production data and preset programming. All memory reset doesn't change any other settings, calibrations or preset keys.

7.5 Head module power

It is possible to disconnect the head module and connect it again without need to restart motomit. Connection time varies a bit depending on the system, but it is much less than the whole system start-up time. Userlevel must be STANDARD or higher. Works with motomit IT and PC with any head module.

7.5.1 Disconnecting the head module

> Maintenance > Resets ...
Turn head power OFF
Voltage to the head module is immediately cut off.
Therefore all the connectors are inactive.

A message tells that the power is turned off from the head module and keyboard module. Data transfer and printer work normally.
Main display shows a message that the head power is turned off. This message comes always when there is a connection fault in the CAN bus.

7.5.2 Connecting the head module

Turn head power ON.

**motomit** starts to create the connection.

When the connection is restored, **motomit** shows cabin and head module versions and asks you to close the head if diameter is measured by pulse encoders.

**motomit** tries to restore the connection 10 times. If it fails, there is a break in the CAN bus. Fix the cable and try to restore the connection as described above. You don't have to restart **motomit**.
8 SETTINGS

8.1 Operating modes

Feeding style

FEED KEY START
Head doesn't stop to any preset. Can be used for delimbing the whole stem.

PRESET KEY START
Automatic feeding is started by pressing a preset key (length, species, product type). Head stops when the preset length is reached. After the piece is cut, feeding must be restarted again by pressing a preset key. At any time, pressing any feed button will stop the feeding.

AUTOMATIC FEEDING
Like preset key start, but automatic feeding starts again after the piece is cut without need to press any button. Shift to manual operation by pressing any feed button, and back to automatic operation by pressing a preset key.

HOLD DOWN FEED
Select a preset and hold fast forward button down. The head will feed to the preset length and cut it automatically and keep on feeding and cutting as long as the button is held down. > Settings > Saw ... Saw return must be AUTO2.
Automatic preset change

LENGTH
The preset will automatically change to the longest possible preset of the same product type, if the minimum diameter limit is reached. With this setting a long preset with a small minimum diameter value is chosen instead of a shorter preset with a bigger minimum diameter value!

DIAM.
Recommended always when value optimising is not in use.

The preset will automatically change to a shorter one of the same product type, if the minimum diameter limit is reached and there is a shorter preset defined. First preset for a new stem is set in the window > Scaling > Species ... First preset.

VALUE
The preset selection is made automatically according to the price list and stem prognosis to optimise the value of the stem.

QUAL.
Same that VALUE, but allows the operator to select which product types are taken into account in optimising.

Automatic product type change

OFF
The product will not change when there are no shorter presets available in the current product.

ON
If you cut a log which is below its minimum limits, it will be registered as pulp. A pulp that is cut under its min diameter stays as pulp.

AUTO
If you cut a log which is below its minimum limits, it will be registered as next possible smaller product like possibly a small log. A pulp that is cut under its min diameter is registered as REJECT.

Forcing to choose species

ON: You must select a species (press a species key) always before starting on the new stem. Otherwise feeding is not activated.
8.2 Feeding

All adjustments for feeding should be done with the hydraulic system at normal working temperature and at normal working revs.

**Min speed of proportional valves**
- Feed signal starts to rise from this value at the beginning of the acceleration ramp.
- Press slow forward button and adjust **Forward slow prop. speed** so that the tracks are just barely turning. Put that value here as Min speed.
- Too low: Part of the feeding ramps are on an area where feeding doesn't work. Finding the cutting window becomes inaccurate.
- Too high: Movements of the head are abrupt, tracks may slip and finding the cutting window becomes inaccurate. Propo min speed must always be the lowest of the feeding propo values.

**Max speed of proportional valves**
- Find the lowest value when the maximum feeding speed is achieved. If the maximum speed is reached at e.g 80 %, don't set the value any higher.
- Too low: It can cause vibrations in the hydraulic system during feeding, because the spool in the feeding valve is not fully activated.
- Too high: The feeding speed will not decrease in the beginning of the deceleration time, which can cause the breaking too irregular. Finding the cutting window becomes inaccurate. Part of the feeding ramps are on an area where there is no effect on feeding speed. Propo max speed must be the highest of the feeding propo values.

**Stopping advance**
- Feeding slows down from max speed to slow speed this much before the cutting window.
- Too short: Head has to reverse back to the length.
- Too long: Harvesting becomes slow as the head is fed in slow speed.
Backing advance
After passing the length, reversing is activated and at this distance from the desired length, feeding is switched off.

Acceleration ramp
Acceleration time from the minimum feeding speed to the maximum feeding speed.
Too short: Movements of the head are abrupt, and hard for the mechanics.
Too long: Harvesting becomes slow. Difficult to start feeding a branchy stem.

Deceleration ramp
Deceleration time from the maximum feeding speed to the minimum feeding speed.

Control pulse
If the stem has not stopped inside the cutting window, the computer will give feeding pulses, ‘control pulses’ to feed the stem into the cutting window. With this setting you can adjust the length of this feeding pulse.
Normal setting is 50 - 150 ms, depending on the head type. Bigger heads normally require a longer control pulse.
If the control pulse is too long, the log is fed back and forth over the cutting window. If the control pulse is too short, the stem will not move at all.

Forward slow prop. speed
Reverse slow prop. speed
Find the lowest value when the slow feeding works well.
Too low: Head has no power to feed. Main screen shows message "NO MOVEMENT". Knot backing may get activated.
Too high: Log is fed back and forth over the cutting window.
8.3 Pump control

Pump settings control the proportional pump outputs of the MCI module. In case of ON / OFF purpose, use values 0 = OFF and 100 = ON. There are similar settings for Pump 1 and 2 outputs.

If the engine of the base machine has stopped, release all functions that may activate pump signals before starting the engine.

**Pump normal**

PWM signal value for head movements like tilt, knives, head open.

**Pump delay**

Delay times can be set to keep the output active after the functions are set off.
8.4 Saw

Saw return

OFF
No hydraulic return, saw bar returns by a spring. Not used.

ON
Hydraulic saw bar return. Saw control not in use.

AUTO
Saw bar control in use. Sawing is started by a short press of the saw button (<0.5 s). Longer press switches the control off and saw bar comes further out.

AUTO2
Like AUTO, but the saw button may be pressed in advance during feeding, sawing starts if the length is reached within 5 seconds.

AUTO3
Like AUTO, but saw control is in use also in the felling cut.
SAW CONTROL

Pulse settings should be correctly set so that color marking would mark well all sizes of logs. Make all adjustments while the engine is not running. Saw control in cross-cutting works after feeding 50 cm.

Switching to manual mode:
- Felling: Press saw button again and keep it pressed until the stem is cut through.
- Cross-cutting: Instead of pushing the saw button, keep it pressed until the stem is cut through

motomit counts the number of pulses received from the saw bar sensor and calculates the actual position of the saw bar from the “saw home” position by using two settings:
- number of pulses before saw bar reaches the stem
- total number of saw pulses

Parameters for saw control and colour marking control

**Pulses from saw to stem**

Number of pulses received before the saw bar reaches the stem.

**Pulse amount**

Number of pulses received when the saw bar is fully out. See Pulses 4 in test display.

**Oversaw distance cross-cut**

When using saw bar control. Distance that the saw bar comes out after the computer has calculated that the stem is cut through.

**Oversawing in felling**

Keep the saw button pressed. Touching the button doesn't work in the felling cut.

If the saw control doesn't work, check:
- saw pulses on the test display, should not be negative pulses
- pulse settings
- saw return -setting
- you have fed more than 50 cm
Protection for log sawing

If this setting is ON, the head must have stopped within the cutting tolerance (green light turned on) to allow sawing to start. If the head has not stopped within the cutting tolerance or the minimum diameter is already reached, the operator has to press SAW button twice.

Delay before sawing

Delays the saw bar out function after the saw motor has started, in order to accelerate the saw motor enough.
8.5 Pressure

Pressure control for proportional valves.

Example:

Pressure for the rollers with values like in the previous page:
- 86 %  \text{Max} value in felling cut and when pressing Head close.
- 70 %  \text{Min} value while feeding and diameter is less than 160 mm.
- 76 %  \text{Mid} value while feeding and diameter is more than 300 mm.
- 70 - 76 % Pressure varies linearly between \text{Min} and \text{Mid} when diameter is 160 - 300 mm.
8.6 Colour / lubrication

Automatic colour marking

Colour marking / product type is set in the window > Scaling > Presets ..Product types. This must be ON to have automatic colour marking in use.

Colour spraying time

Time that the output(s) for colour spraying will be ON when the colour marking is activated.

Advance for colour spraying

Advance to compensate the delay of the colour-marking device before spraying. Spraying is activated this millimeter amount prior to the tree is cut through.

Urea spraying delay min / max

Delay after pressing the saw button before the stump treatment pump is activated. Min and max values help you to set treatment for both small and big stumps. Negative Min value delays the saw.
8.7 Knives

Knives open pulse time
Opening time for the front knives when the feeding starts. Makes it easier to start feeding when the knives open a little. There is a corresponding setting for the back knives.

Delay before open pulse
Delay for the front knives opening pulse in order to get the function to happen exactly the same time when the feeding starts.
E.g. The value is set to 50 ms:
When feeding is started, the feed roller motors will get a signal and after a delay of 50 ms, the knives will pulse open.

Knives close pulse time
Length of the closing pulse while feeding.

Knives close pulse interval
Interval how often the closing pulse is activated.
8.8 Tilt

Tilt mode

**ON**
When pressing the tilt up button, the previous tree is finished and confirmed to the counters. The harvesting head tilts up. The “Saw” button tilts the head down.

**ONLY CONFIRMS**
The head will not tilt up, but the tree will be finished. Use when you don’t need to tilt up the head.

**BUTTON**
A tilt limit sensor is required for tree counting. The harvesting head is lifted up while the TILT UP button is held down. After releasing it, the head is tilted down. The tree is confirmed when the tilt sensor comes on. This is when the head is fully in the upper position. You can tilt up the head a bit to get better delimbing without finishing the current stem. Sawing does not tilt the head down.

**ON-OFF**
The first press tilts the head up, and the second tilts it down again. The tree is finished when the TILT UP key is pressed to lift the head. The saw button does not tilt down the head.

**AUTOTILT**
When pressing the TILT UP button (or HEAD OPEN button in some programs), the rollers and the knives open and the head tilts up. The timing of the opening and tilting up is controlled by the parameters ‘head opening time’ and ‘tilt up time’,

**Head opening time**
Used with AUTOTILT function. Head starts to open after the tilt command. After this time period the tilt up solenoid is activated.

**Tilt up time**
Used with AUTOTILT function. The head continues to open this time period when the pump is still activated in order to lift the head fully up.
8.9 Other

Overrun distance

The head is fed past the preset length at the amount of Overrun distance and then reversed to the cutting window. Set OVERRUN in the window > Scaling ... Product types

Knot backing distance

The machine will reverse this distance if the head gets stuck on a difficult branch and try again.

Fast backing distance

Used in knot backing. The head reverses backwards this distance at maximum speed without the acceleration ramp.
8.10 Head

These are start-up settings for the head.

**Head type**

Shows which head type is selected in the Start-Up window.

**Hydraulic block type**

Affects the control of the knives, rollers and pressures during feeding.

**Diameter sensor type**

- POTENTIOMETER 1 PC, POTENTIOMETER 2 PCS,
- PULSE COUNTER 1 PC or PULSE COUNTER 2 PCS

**Saw bar width**

Saw dust is not taken into the timber volume.

**Distance from saw to meas.**

Distance from the saw bar to the point where the diameter is measured.

**From saw to photocell**

Distance between saw bar and photocell (optional equipment).

When the stem passes the photocell, this value will be added to or subtracted from the present length, depending on the setting.

E.g. The value is set to –80 mm.

When the stem passes the photocell, the fed out length will be set to - 8 cm and continue to count from that value.

E.g. The value is set to 150 mm.

When the stem passes the photocell, the fed out length will be set to 15 cm and continue to count from that value.

If the photocell is mounted between the rollers and the sawbar, the value should be negative, e.g. –80 mm.

If the photocell is mounted between the sawbar and the bottom plate, the value should be positive, e.g. 150 mm.

**From saw to top saw**

Distance between top saw bar and normal sawbar. Top saw is an optional equipment.

**Backknives**

Select if the head is equipped with back knives. The output is controlled only when the setting is ON.
8.11 Machine

Machine information is printed on some reports and used in the data systems of the forest companies. Program versions appear on the screen for a couple of seconds when the power is turned on and they can be checked in this window at any time.

Machine information is printed on some reports and used in the data systems of the forest companies. Program versions appear on the screen for a couple of seconds when the power is turned on and they can be checked in this window at any time.

8.12 Operator

Operator information is used in the working time reports. Select the current operator on the right of the name.
9 REPORTS

Some situations when it is good to print reports out:
- Preset tables at the start of a cutting area, if there has been changes
- Measurement proof and log lists at the end of the cutting area
- Auxiliary memory, stem profile and calibration report in connection with calibration
- Auxiliary memory for volume control
- Settings printout when changing or repairing the head

Finish the stem - tilt the head up before printing.

9.1 Volume

Measurement proof OK prints out a volume report from the currently active Cutting area. Active Cutting area is changed in window > Scaling > Identification.

In the Other volume printouts frame you can select a simple volume printout without identification info of the cutting area. Reject pieces can be included in the Product grouping reports.

Log list shows total quantities and deviation percentages for each length class. Sorting for diameter classes is done by top end diameter for the log products. Poles are sorted by middle diameter.
9.2 Other reports

Select the printout from the list. Depending on the choice you may be able to do some additional selections.

Settings
- Settings for hydraulics, feeding, operating modes.

Calibrations
- Length calibration factors, values of diameter calibration points and last calibration dates.

Keyboards
- Functions which are programmed to the preset keys.

10cm stem profile
- Diameters of 10 cm slices from the last stem. First measurements from the saw to diameter sensor are calculated from the butt-end curve.

Auxiliary memory

Options in the window allow you to set the number of stems to be printed out. You may print only a summary or include a list of individual pieces. Piece list contains the cut length of each piece, top diameter, volume and diameters at 50 cm, 150 cm ... in one meter intervals. Make use of this report in calibration.

Error codes

Report shows the most recent error codes. There are rows with error counter, time stamp when the error has last occurred, short description and in most cases a hint what to do. Texts in English only.

9.3 Print preview

Choose a printout and Print preview OK.

Printing starts from OK button.

Press arrow down to move around the preview window.
ESC moves the cursor back to the OK button and then back to the previous screen.
9.4 On screen

Production follow-up on screen. All species or all products of one species at the same time.

Working hours are in the next window.
10 CALIBRATION

Due to the different wood properties, both diameter and length calibrations can be adjusted individually per species. Feeding and pressure settings affect greatly on measuring accuracy.

Basic calibration should be done at least in these cases:

- taking a new head in use
- replacing an encoder
- any repair work that could affect to the calibration

It is recommended to take the calibration report once and a while and at least before making any major changes.

10.1 Basic length calibration

motomit converts the pulse signal from the measuring wheel into millimeters. Length calibration is about adjusting a correction ratio by which the millimeter value is multiplied with. The ratio is given as an integer which motomit divides by 1000. E.g given value 998 equals the correction factor of 0.998. Since one digit is 1/1000th it means one centimeter correction in 1000 cm piece or 0.5 cm in 500 cm piece. The bigger the ratio, the shorter pieces will be fed.

Length calibration affects only on accuracy of measuring. The preset length determines the correct cutting length.

Check these settings - Measuring wheel diameter and Pulses/revolution - after loading the default values for the head.

Ask the correct values from the head manufacturer or check them by using measuring tape and test display.

Measuring wheel diameter

In millimeters.
Pulses/revolution
Number of pulses that the sensor gives on one revolution.

Correction ratio 900 – 1100

Save the correction ratio OK sets the ratio to all species. Used when taking a new head into use. Value in this window returns back to 1000. Normal calibration per tree species is done in the window > Calibration > Length.

10.2 Length calibration

In the window > Calibration > Length the calibration ratio can be set per tree species.

Feed a long log and cross cut it. Measure the length of the log with a measuring tape. Go to window > Calibration > Length and choose the tree species. motomit shows the length of the log in millimeters. Give the manually measured length in the field Actual length. A new correction ratio for this species is calculated. Accept the change by pressing Save the correction ratio OK.

NOTE! New length calibration will be used for the next stem, not before. Tilt up or press NEW STEM to get new calibration in use.

Butt correction
If the measuring wheel gives too much pulses due to the soft bark it leads to too short logs. This problem can be avoided by setting a butt correction. It works only for the first log of the stem where this normally occurs. The correction doesn't change any programmed preset length. Use a wider measuring wheel, adjust the pressure to the wheel and check the encoder and its wiring and mounting if there is variation in lengths.

Example: Butt logs of pine tend to be 80 mm too short. Select PINE at the top of the window. Set Butt correction 80 mm. Next butt logs will be 80 mm longer.
10.3 Basic diameter calibration

Basic diameter calibration sets reference points for the opening of the head. It must be done always after changing or repositioning the sensor. It does not affect to the shape of the calibration curve.

NOTE! After the felling cut diameter doesn't change if the length doesn't change.

A certain amount of filtering is needed to filter out rapid changes in diameter caused by the knots.

Filtering

0 = no filtering
1 = measurement sensors on rollers
2-7 = filtering increases the bigger the number is (not recommended)
8 = always decreasing diameter (measurement sensors on knives). Diameter doesn’t increase if you open the head while making the stem.

Measured diameter in millimeters is shown in the Diam field.

Steps for the basic calibration:

- Press Do diam calibration OK to start the calibration procedure.
- Close the head fully, as the display advises and press ENTER. Number of pulses is zeroed or in case of potentiometers, the minimum resistance is shown. Another sensor field is for the heads with two sensors.
- Open the head fully and press ENTER. Maximum pulse count / relative resistance is displayed.
- Basic calibration for diameter is done.
NOTE! Heads with pulse encoders:

**motomit** shows an error message on the screen if A and B channels are connected wrong ways in the head module.

Sensor should not give a negative pulse count as you open the head. Connect the channels other way round and make the basic diam calibration again.

### 10.4 Diameter calibration

Diameter curve consists of 33 points, with a line drawn through them. Each species has its own diameter curve. The whole curve or a desired section of it, e.g. points 200 - 250 mm, can be lift or sunk by a desired amount of mm. The more you lift the curve up, the more volume **motomit** will calculate.

#### 10.4.1 Repositioning the curve

Select the species and set **Start** and **End diameters**. **Correction** will change all of the points in the curve which are in between this diameter range. Give negative correction value if you wish to lower down the curve.

Example. **motomit** measures 15 mm too big diameters for spruce pulp. **Start diameter** can be 0 mm and set 150 mm as **End diameter**. **Correction** =–15 mm. Execute OK.

**Copying the curve**

It is possible to copy the diameter calibration from one species to another. Select the species you wish to copy the values to and press **Copy OK**.
10.4.2 Calibration curve

Calibration curve is in the next window.

Points of the curve, 1 – 33 are on the X axis and head close – head open diameter range in on the Y-axis. The basic, factory curve is in blue and the calibrated curve in yellow.

Individual calibration points can be adjusted graphically in the curve. First you have to press MENU-down to activate the grid.

A small white square shows the active point in the curve. Move between the points with LEFT/RIGHT -buttons. Before you can adjust the point, press ENTER. White square turns into black and you can raise or lower the point with MENU-key. Number of the point and its previous and new value appear on top of the grid.

10.4.3 Calibration table

Calibration table is in the next window.

Shape of the curve depends on the mechanics of the head. If the error in measurement is suddenly large, it indicates a mechanical or signal fault, which should be investigated.

Columns in the table:

# = index number of the point. 1 – 33.

Basic = Factory setting which will always be the same.

Calibr = Measuring is made by using these values. Only this column is editable.

Change = Shows the difference between the factory value and the calibrated value.

The last two columns are for auto calibration.

Sugg = Shows the calibration suggestion in millimeters if you have transferred data from electronic callipers to motomit

Pcs = Shows how many measurements have been made in each diameter class with the electronic callipers

Example. Diameter on the screen is 160 mm, but actual diameter is 150 mm.

Find some points that are close to 160 mm. Reduce values by 10 mm. Make sure that you don’t make a sharp bend to the curve. By this way we tell to motomit that where it used to measure 160 mm it should measure 150 mm.
11 Control measurement

Control measurement is about measuring a couple of harvested stems with callipers and then comparing this real volume with the volume measured by the measuring device. As a result of this comparison, motomit calculates you an automatic calibration suggestion for both diameter and length. Data of the last harvested stems is kept in auxiliary memory and data sent back to motomit from the callipers is stored in the reference memory.

11.1 Autocalibration

The following describes the control measurement procedure in brief, step by step. See also a separate, more detailed manual about using the electronic callipers.

1. Tilt the head up. Reset the auxiliary memory. > Maintenance > Resets.
2. Reset the reference memory. You can also reset this memory after the control measurement. > Calibrations > Auto calibration.
3. Harvest a couple of nice, straight stems which represent well the whole diameter range.
4. Tilt the head up. Open the reports window and select auxiliary memory from the list. Number of stems = number of stems in the aux. memory that will be transferred to the callipers. Print the report on the paper.
5. Transfer the stem data from the auxiliary memory to the callipers. See the additional manual.
6. Measure the stems with the callipers.
7. Transfer the measurement data from the callipers back to motomit.
8. Print the comparison report > Calibrations > Auto calibration.
9. Analyse the results of the control.

Analyzing the results of the control measurement

Go to the window > Calibrations > Auto calibration, select the tree species and press Next window so that you get to the calibration table window. Suggestion is in the Sugg column in millimeters for those diameter classes that have been measured in the control. The value can be positive or negative and it will be added to the Calibr column if you accept the suggestion.

NOTE! Callipers filter out all diameter measurements that differ more than +/- 20 mm.

11.2 Control measurement without electronic callipers

1. Reset the auxiliary memory.
2. Harvest a couple of nice, straight stems which represent well the whole diameter range.
3. Print the auxiliary memory report on the paper.
4. The report contains diameter values at one meter intervals (first point at 50 cm). Measure the diameters at the same points and write the values down.
5. Analyse the results and move the calibration curve.
12 COMMUNICATION motomit IT

Data transfer property with Flash memory card is included in all motomit IT versions. More about data transfer in the additional properties manual.

Transferable file types depend on the program version. MAS save and load is in all versions.

From memory card to motomit:
- APT Scaling information
- MAS Machine settings, calibrations

From motomit to memory card:
- PRD Production data from the current Cutting area
- APT Scaling information
- MAS Machine settings, calibrations
- STM Data from the last stem harvested
- DRF Work time monitoring, Operations follow-up
- DUMP Binary file for software developers’ use only

NOTE! Whenever you insert the Flash card for data transfer into its slot or remove it, make sure that motomit has power ON and the main window is visible.
Always before starting the data transfer make sure that the previous stem is finished, tilt the head up.

You can’t load all files if the user level is too low.

12.1 Loading

1. Insert the card into its slot.
2. Go to the window > Data transfer > Load.
3. Choose the file and start loading with ENTER.
4. Wait for a couple of seconds until the loading is completed.
5. Return to the main window and remove the card.
When loading a MAS file, you can select which settings to load.

**Example.** How to copy calibration values from a machine to another:
- Save MAS to card in machine 1.
- Load MAS from card in machine 2.
- Select only Calibrations, press OK.

The same MAS file works for all motomit models.

12.2 Saving

1. Insert the card into its slot.
2. Go to the window > Data transfer > Save.
3. Choose the file and start saving with ENTER.
4. Wait for a couple of seconds until the saving is completed.
5. Return to the main window and remove the card.