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**Tech Measure**

# TM2200

series 4.5

**User manual**

Revision 1.2/UK

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## **Introduction**

We congratulate you on your new Tech Measure 2200 measuring system, the latest addition to measuring systems for forest machines. The TM2200 supports what is demanded by the latest forestry machines, harvesting heads and technologies within modern forestry. The TM2200 has the following functions, specifications and extension possibilities:

### **Optimizing**

The TM2200 will come up with a suggestion to the optimizing of the log, based on the diameter and the tapering of the log. In this way you can increase the production, as the TM2200 is calculating and working up the log with a view to obtaining the highest possible value of each log. With the distribution bucking it is ensured that the TM2200 takes into account that a certain relationship must exist between all the qualities/presets and still the best possible value must be obtained.

### **User-friendliness**

The user-friendliness has been a very important parameter in the development of the TM2200, and it can be used by most people without much introduction. The TM2200 is a further development of the well-known TM2000 system, which was already in front as regards user-friendliness.

### **Accuracy**

With a correct set-up and calibration, the TM2200 is a very accurate system, and compares favourably with any other similar systems on the market.

### **Advanced**

Although the system is very user-friendly, the TM2200 is also a very advanced system, which can be adapted to most forest machines and the demands and requirements, which must be met, both in the United Kingdom and abroad.

### **Modern**

The TM2200 supports the latest technologies within forestry. As additional equipment you can buy GPS solution and electronic data calliper solution.

The GPS solution can be extended as the need arises, starting with GPS on the harvester, expanding with an office solution, where each machine and its production can be followed, and then including a GPS solution for forwarders, which can be controlled and followed at the office.

The data calliper is facilitating the test measuring job, as the hand-measurements are transmitted directly to the computer and only need to be confirmed, when you are back in the machine.

### **Office Solution**

With the additional equipment "TM-Office" you can make printouts and set up new projects in the office and send or take with you the prepared projects to the machine. With the TM-Office you can

even create your own printouts and save them for later use.

## **Future-orientated**

The TM2200 is constantly maintained and developed. Thus we are always up to date as to the latest demands to the forest industry, the drivers and the future forestry machines and we make sure that the TM2200 will be able to meet these demands. The existing functions of the TM2200 are also evaluated, based on feed back from the users and the suppliers and will be improved currently, if need be. The integration between TM2200 and the office solution (TM-Office and GPS) is currently improved and extended and secures your investment in the TM2200 for many years to come.

## The Main Screen

The main screen will be shown when starting up the TM2200 and this is the active window during the cutting and bucking of the logs.

The screenshot shows the main interface of the TM2200. At the top is a menu line with options: Shape of trunk, Tree species, Calibration, Project, Settings. Below this are two large display boxes: the left one shows 'L: 1283' and a large '0', the right one shows 'D' and a large '235'. Below these is a line graph showing the 'Shape of trunk section' with a blue line representing the trunk's taper. A status bar below the graph shows 'RGR: 1283 / 0 | 3,00: 300 / 40'. Below the status bar is a section for 'Demo' with 'LTR: RGR' and a clock showing '09:57'. At the bottom is a 'Database section' containing a table with columns: Time, Tree species, Preset, Length, Top diameter, Middle diameter, Bottom diameter, Volume, Mark, Tapering factor.

Time	Tree species	Preset	Length	Top diameter	Middle diameter	Bottom diameter	Volume	Mark	Tapering factor
06-12-2004 09:53:16	LTR	RGR	1757	101	205	263	0,580		0,92
06-12-2004 09:53:02	LTR	RGR	2003	104	255	401	1,023		1,48
06-12-2004 09:52:51	LTR	3,00	306	96	124	150	0,037		1,76
06-12-2004 09:51:49	LTR	RGR	1203	150	262	334	0,649		1,53
01-12-2004 13:49:52	LTR	RGR	1246	147	218	0	0,465		0,90
01-12-2004 13:48:16	LTR	RGR	1011	114	187	234	0,278		1,19
01-12-2004 13:48:08	LTR	3,00	300	234	252	0	0,150		0,60
01-12-2004 13:47:44	LTR	3,00	302	96	110	123	0,029		0,89
01-12-2004 13:47:42	LTR	3,00	302	123	132	141	0,041		0,60
01-12-2004 13:47:40	LTR	3,00	302	141	156	259	0,058		0,56
01-12-2004 13:47:17	LTR	RGR	1022	182	214	266	0,368		0,94
01-12-2004 13:46:49	LTR	RGR	1287	112	191	0	0,369		0,97

The main screen is divided into the following sections:

- Menu line
- Diameter- and length section
- Shape of trunk section
- Tree species- and preset section
- Database section

### **The Menu line**

From the menu line you have access to the various program functions.

### **The Diameter- and length section**

Here the current diameter at the saw and the current length are shown. Both the diameter and the length are constantly updated, when a log is being fed through the harvesting head.

At the top of the fields the length and the diameter, which the system is trying to work up at the moment, are shown.

At the bottom in the diameter field an optional diameter is shown. This can be changed or removed

by right-clicking on the number and choose, which diameter you want to be shown.

### ***The Shape of trunk section***

Here the shape of trunk profile of the already bucked part of the log is shown. Also the already carried out cuts (green and red markers) are shown, as well as the expected (with yellow markers). On the cuts already carried out, a green marker indicates that the log has been accepted in the relevant preset, whereas a red marker indicates that the log was not accepted in the relevant preset.

### ***The Tree species and preset section***

In this section is shown, in which project you are working (to the left) and which preset was chosen (in the middle). To the right in the screen the time and the saw indicator are shown. The time is shown in red, if an accepted log was not cut within the last 15 minutes, whereas it is shown in black, if an accepted log was cut within the last 15 minutes. The saw indicator is grey, when the saw is in and it changes into red, when the saw is out.

If GPS is mounted on the machine (additional equipment), the current GPS position is shown in degrees of latitude and degrees of longitude within the G15 time. The figure in the brackets indicates the number of visible satellites.

### ***The Database section***

Here the latest cut logs are shown. You can choose which column you want to be shown by pushing the database section and choose the relevant columns. You can also choose, what you want to be shown in the columns by pushing the title line at the top of the database section and choose the part, you want.

Please Note: If you choose a certain tree species within the column "Tree Species", you can limit it to a certain preset in the column "Preset". This possibility *is not* present, if all tree species are shown.

## Tree Species

The program point "Tree species" is chosen from the main screen with "Tree Species, Edit" (or "Tree Species, New" if there are no tree species already).

Calibration table:	*Standard*
Manoeuvre pattern:	321
Roller pressure:	0 %

Activation	Value	Distribution	Limit	Colour	Registration
100 - -					
800 - 1400	X				
1100 - 2000	X				

### ***How to make a new tree species***

In order to make a new tree species, you must choose "File, New" and enter a name for the tree species.

Then you must choose the calibration table, you want to be used for this preset.

Then add the wanted presets for the tree species by choosing "Preset, Insert".

You must choose a manoeuvre pattern and, if necessary, a roller pressure for each preset. Both are described below.

Use the button "Diameter" to enter the diameter demands and the button "Length" to enter the length demands. This is also described below.

At last you must enter the relevant values for Activation, value etc. for all diameter-/length combinations.



## ***How to edit an existing tree species***

The tree species, shown in the screen, can be corrected and the changes saved automatically, when you push the button "Return" or you choose "File, Return" in the menu line.

## ***The Manoeuvre pattern***

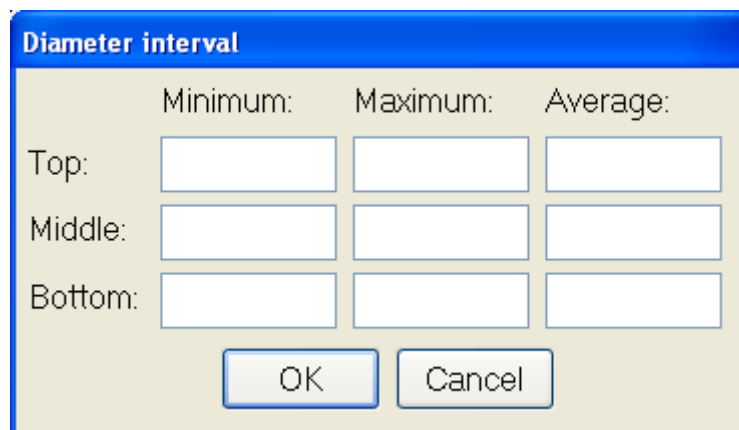
For each preset the manoeuvre pattern, which is used by the preset chosen, must be stated. Push the field "Manoeuvre pattern" (to the right in the screen just under "Calibration table") and the TM2200 will show a list of the already entered manoeuvre patterns. You can also create a new manoeuvre pattern by choosing "Manoeuvre pattern, New manoeuvre pattern" from the menu line.

## ***The Roller pressure***

For each preset you can enter the constant roller pressure, which you want to use for the preset in question. If no roller pressure is stated (if it says "0" in the field "Roller pressure"), the standard roller pressure of the machine will be used.

## ***Create a diameter demand***

In order to create a new diameter demand, you must push the button "Diameter" to the right side of the screen. The TM2200 will now show the following screen:



	Minimum:	Maximum:	Average:
Top:	<input type="text"/>	<input type="text"/>	<input type="text"/>
Middle:	<input type="text"/>	<input type="text"/>	<input type="text"/>
Bottom:	<input type="text"/>	<input type="text"/>	<input type="text"/>

OK Cancel

In this screen you must enter the relevant diameter demands for top, middle and bottom diameter respectively. You can enter demands for both minimum, maximum and average diameter. If you leave a field empty, this means that there is no demand regarding the combination in question, e.g. a value in "Minimum, Top", where all other fields are empty, will mean that the system will work according to one minimum top diameter only.

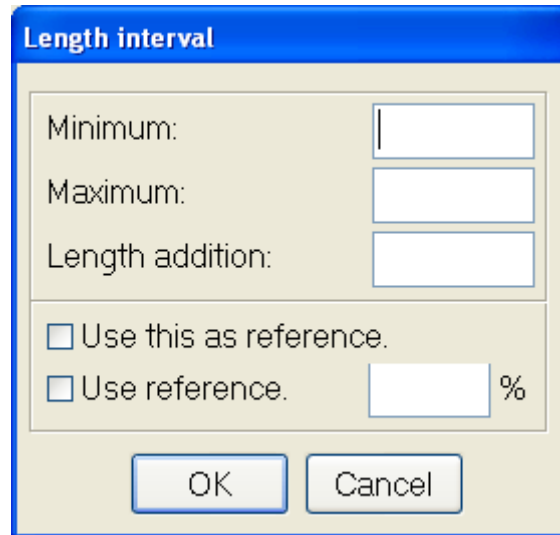
## ***Correct a diameter demand***

In order to correct an existing diameter demand, you must push the button containing the diameter demand, you want to correct. The TM 2200 will now show the window "Diameter Interval" (as above) with the existing values entered and with a button, which will enable you to delete the

diameter demand.

### **Create a length demand**

In order to create a new length demand, you must push the button "Length" at the bottom of the window. Now the TM 2200 will show the following window:



The screenshot shows a dialog box titled "Length interval". It contains three input fields: "Minimum:", "Maximum:", and "Length addition:". Below these are two checkboxes: "Use this as reference." and "Use reference." followed by a percentage input field. At the bottom are "OK" and "Cancel" buttons.

In this window you can enter the relevant length demands. If you leave out the minimum or the maximum, the system will work according to a maximum or a minimum demand only. If you want a certain length, you must enter this length in both the minimum and the maximum field.

The additional length is to be used, if you want a supplement to the length, which you don't want included in the volume of the log.

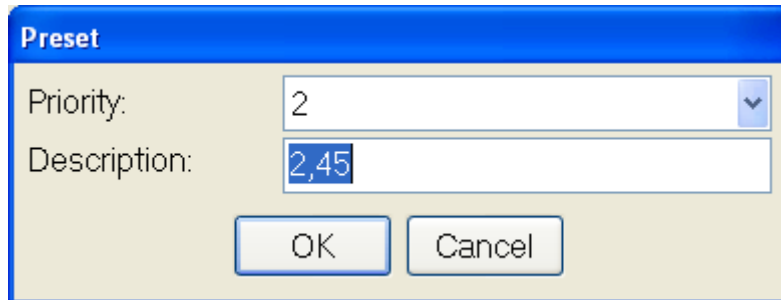
"Use this as reference" indicates that this length demand must be used as reference to other length demands. The demands, for which you want the reference demand used, must be ticked off in "Use reference" and a value must be entered in the field "%", which indicates the length interval as a percentage of the minimum and maximum lengths of the reference demand.

### **Correct a length demand**

In order to correct an existing length demand, you must push the button containing the length demand, you want to correct. The TM 2200 will now show the window "Length Interval" (as above) with the existing values entered and with a button, which will enable you to delete the diameter demand.

## ***Correct a preset priority or the name of a preset***

In order to correct the preset priority (or the preset order of succession) or the name of a preset, you must double-click on the name of the preset in the list "Preset". The TM2200 now shows the following window:



In this window you can correct both the priority and the name.

## ***Setting up values for the diameter-/length-demand combinations***

For each diameter-/length demand combination, a field appears in the section at the bottom of the window. On the different pages different set-ups and values for the diameter-/ length combinations can be entered. You can choose the various pages by pushing the guide card at the top of the section.

### **Activation**

On the page "Activation" you can indicate with a cross, if a given diameter-/length combination is activated. When a new diameter demand or a new length demand has been entered, the TM2200 will automatically activate the new combinations. If a combination is not activated, logs in this combination cannot be accepted and the prediction in the value-distribution function will not be able to suggest or to calculate on the not-activated combination.

### **Value**

On the page "Value" the value of each combination is indicated. The function value distribution will always try to produce a combination (or a preset) with the highest possible value. When a new diameter demand or a new length demand has been created, the value will automatically be put at 1. To the right in the window, it is indicated, how the value must be calculated by the value distribution and the field "Full length" must be ticked off, if logs in the preset in question must be worked up at the maximum possible length.

It must be noted that the value is not used for settlement in the TM2200. Therefore it is in some cases practical to use "invented" values, if this results in a more suitable functioning of the value distribution, e.g. if the TM2200 produces too much of a certain preset, you can reduce the value in order to produce less of this preset. You can also increase a value in order to make the system produce more of a certain preset.

Please note: A value **must** be entered for all combinations. The value must be between 1 and 32000. If you don't want to produce a preset or a diameter-/length-combination, you must indicate this by using the page "Activation" and switch off this combination!

## **Distribution**

On the page "Distribution" the wanted distribution between the various presets and diameter-/length combinations must be indicated. The value in the fields indicate the ratio to all other distribution fields in the tree species, e.g. if the distribution between two presets with one diameter-/length combination each is 50, then 50% of each will be produced. If the distribution for both is 1, 50% of each will also be produced (because the ratio is 1:1). This applies whatever distribution per "m<sup>3</sup>" or distribution per "piece" has been chosen, as 1:1 if "pieces" was chosen, means 1 of preset 1 for every 1 of preset 2" (or "50 of preset 1 for every 50 of preset 2" in the first example).

Please note: If no distribution has been entered (the field is empty), the preset in question or the diameter-/length combination will not be a part of the distribution calculations.

## **Limit**

On the page "Limit" you can enter the maximum number of m<sup>3</sup> or pieces, which you want produced in a certain preset. When the limit has been reached, the value distribution will no longer try to produce this preset or diameter-/length combination.

## **Colour**

On the page "Colour" it is possible to indicate that you want colourmarking of logs in a certain preset. You can alternate between the various colour combinations by clicking in the field.

## **Registration**

On the page "Registration" the minimum length for registration of data can be indicated and you can indicate, whether you want marking and test measuring in this preset.

The field "Data collection, Length, min." indicates the minimum length you want for a certain log in order to be registered in the database. Logs under this length are considered "discarded" and are not registered in the database, neither under "Show, if valid" or under "Show, if not valid".

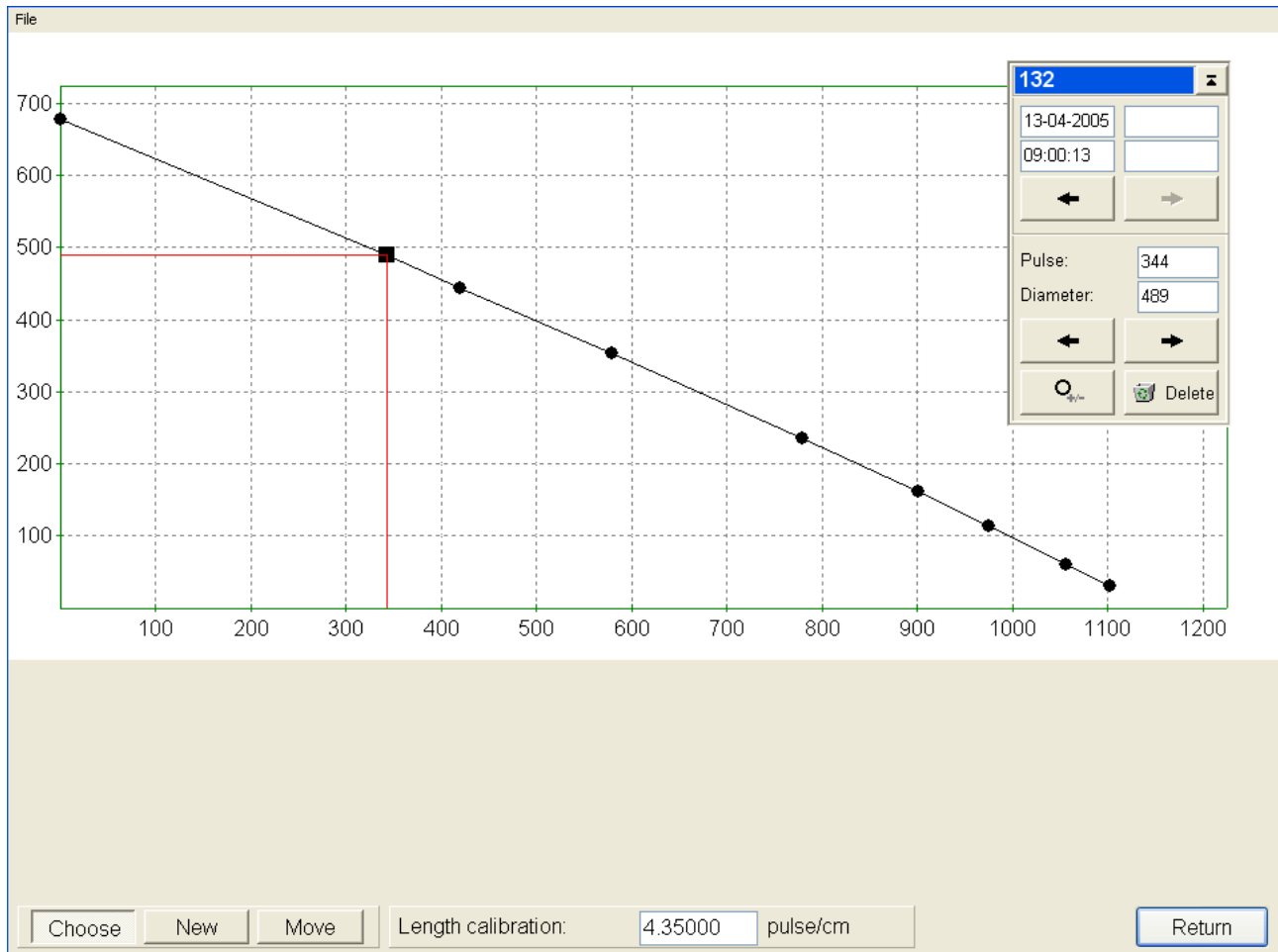
In the box "Marking" you can enter the interval with which you want the TM2200 to suggest marking of logs in this preset. The value in the marking is only used, if "Marking" is ticked off.

In the box "Test measuring" you can enter the interval with which you want the TM2200 to demand a test measuring in this preset, and which fields, you want filled in at the test measuring. The values in "Test measuring" are only active, if "Test measuring" at the top of the box is ticked off.

Please note: Since "Registration" is valid for all diameter-/length-combinations in the preset – no individual values for each combination can be entered.

## Calibration

The point "Calibration" must be chosen from the main screen with "Calibration, Edit" (or "Calibration, New", if there are no calibration tables already).



The calibration tables decide the connection between the number of pulses, coming from the diameter encoders of the harvesting head and the diameter, which the TM2200 calculates, based on number of pulses. Further the length calibration indicates the connection between the number of length pulses and the length, which the TM2200 calculates. The foundation of an exact measuring of the logs, which have been cut, is thus subject to correct and thorough calibration. In order to secure the best possible accuracy, the calibration table should contain at least 8 points and preferably points close to the diameters, which have been entered in the presets.

In some cases it might turn out to be necessary to use more calibration tables, e.g. because of the temperature conditions. Then a new calibration table can be entered with "File, New".

In the window "Calibration, Edit" you can see each individual point of the calibration table. In this window you can also add new points and the existing points can be moved or deleted, e.g. if a point turns out to be wrong. A further possibility in this window is that you can go back to a previous calibration table by using the arrow at the top of the small window to the right.

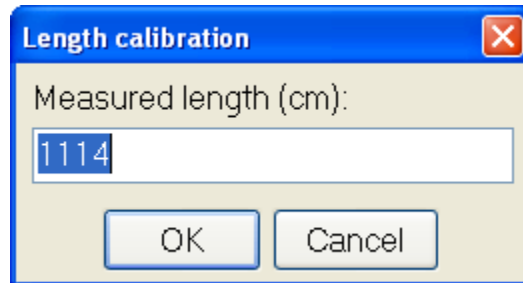
Except for checking the existing calibration table and perhaps deleting wrong points from the table, this window is normally not used, as the diameter calibration and the length calibration can be carried out directly from the main windows.

Please note: The changes made in this window will influence the logs that are being worked up after

the change. The already cut logs will **not** be influenced.

### ***Length calibration***

This point is chosen from the main screen with "Calibration, Length". By activating this point, the TM2200 will show the following window:

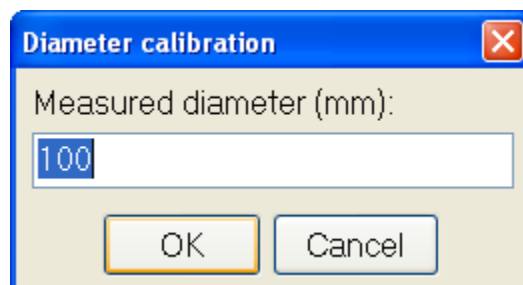


The window will show the length at the saw, measured by the machine (in this case 1588 mm) and it is waiting for the hand-measured length to be entered. When the hand-measured length has been measured, a new length factor will be calculated and this will be used on the logs cut from now on. The already cut logs will **not** be influenced by the new length calibration!

Please note: It is best to carry out the length calibration on a long log, as this increases the accuracy of the length factor.


### ***Diameter calibration***

This point is chosen from the main screen with "Calibration, Diameter". By activating this point, the TM2200 will show the following window:



The window will show the diameter at the saw, measured by the machine (in this case 99 mm) and it is waiting for the hand-measured diameter to be entered. When the hand-measured diameter has been measured, a new point will be added to the calibration table and the new calibration table will be used on the logs cut from now on. The already cut logs will **not** be influenced by the new calibration table!

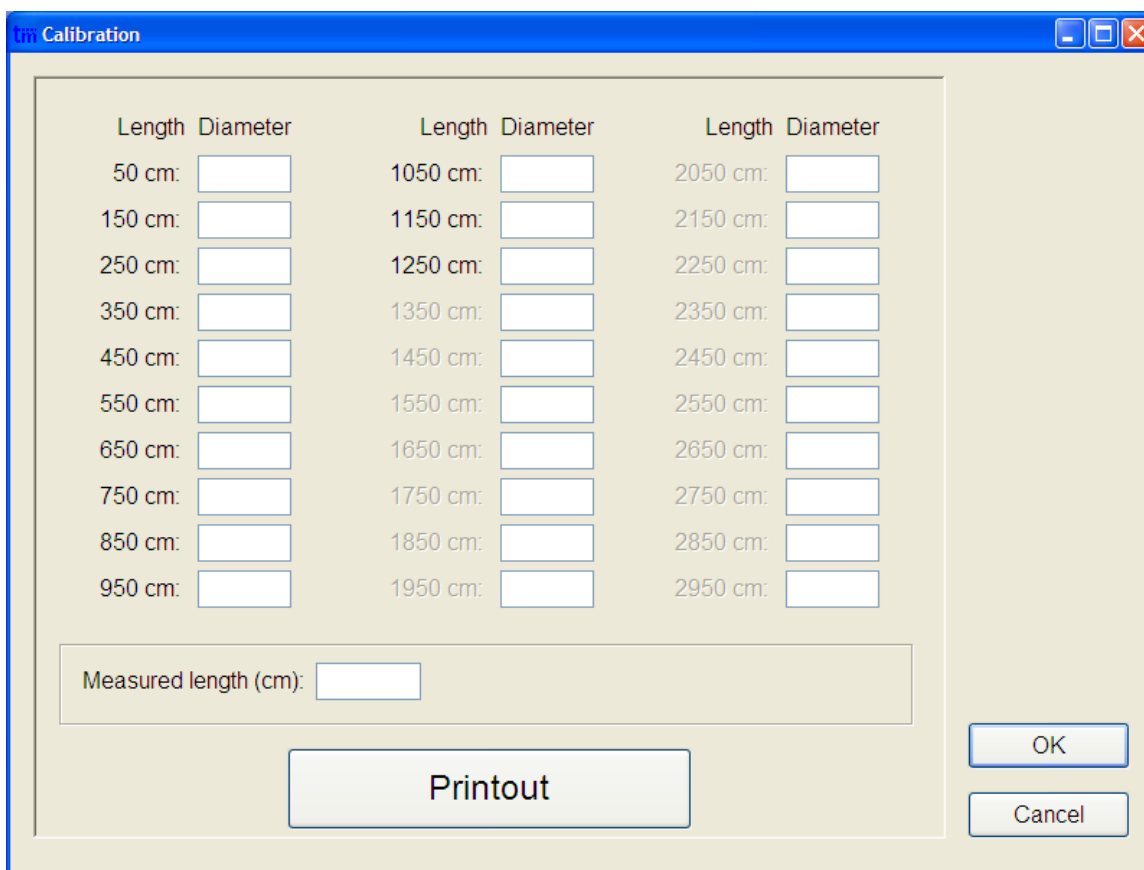
Please note: If the hand-measured diameter does not fit into the curve in the existing calibration table, the TM2200 will give an error sound. In order to find the cause, use "Calibration, Edit", where the new point will be added, but it won't be active. Delete the point, if it is not correct and delete the point before or after on the calibration table curve, which is not correct. Then activate the

point by choosing it and pushing the button  (activate/deactivate point).

## Calibration procedure

This function is used to perform a thorough calibration of the harvester. To use the function, select "Calibration, Calibration procedure..." from the menu - this will put the program into "Calibration procedure" mode. Then perform the following steps:

1. Fell a tree and feed the tree through the processor, without making any cuts. The tree should be selected, so it is a nice and representative specimen.
2. Drop the tree.
3. The window "Calibration procedure" will be displayed automatically.



Length	Diameter	Length	Diameter	Length	Diameter
50 cm:	<input type="text"/>	1050 cm:	<input type="text"/>	2050 cm:	<input type="text"/>
150 cm:	<input type="text"/>	1150 cm:	<input type="text"/>	2150 cm:	<input type="text"/>
250 cm:	<input type="text"/>	1250 cm:	<input type="text"/>	2250 cm:	<input type="text"/>
350 cm:	<input type="text"/>	1350 cm:	<input type="text"/>	2350 cm:	<input type="text"/>
450 cm:	<input type="text"/>	1450 cm:	<input type="text"/>	2450 cm:	<input type="text"/>
550 cm:	<input type="text"/>	1550 cm:	<input type="text"/>	2550 cm:	<input type="text"/>
650 cm:	<input type="text"/>	1650 cm:	<input type="text"/>	2650 cm:	<input type="text"/>
750 cm:	<input type="text"/>	1750 cm:	<input type="text"/>	2750 cm:	<input type="text"/>
850 cm:	<input type="text"/>	1850 cm:	<input type="text"/>	2850 cm:	<input type="text"/>
950 cm:	<input type="text"/>	1950 cm:	<input type="text"/>	2950 cm:	<input type="text"/>

Measured length (cm):

Printout

OK

Cancel

4. Print the measurement report by pressing "Printout".
5. Make the measurements at the lengths stated in the measurement report.
6. Enter the measured numbers in the corresponding fields.
7. Finish by pressing the "OK" button - a new calibration table will be created.
8. Open "Calibration, Edit..." and check the points in the calibration table. If some point are obviously wrong, then delete the wrong point.

The new calibration table is ready for use.

**Note:** If you use an electronic calliper, please follow the procedure described in the "Electronic Calliper" chapter instead.

## Project

The program point "Project" can be chosen from the main screen with "Project, Edit" (or "Project, New" if there are no projects already).

File Summing up

Name:

District:

Department:

Sub-department:

Tree species:

Calibration tables:

Time	Tree species	Preset	Length	Top diameter	Middle diameter	Bottom diameter	Volume	Mark	Tapering factor
06-12-2004 09:53:16	LTR	RGR	1757	101	205	263	0,580		0,92
06-12-2004 09:53:02	LTR	RGR	2003	104	255	401	1,023		1,48
06-12-2004 09:52:51	LTR	3,00	306	96	124	150	0,037		1,76
06-12-2004 09:51:49	LTR	RGR	1203	150	262	334	0,649		1,53
01-12-2004 13:49:52	LTR	RGR	1246	147	218	0	0,465		0,90
01-12-2004 13:48:16	LTR	RGR	1011	114	187	234	0,278		1,19
01-12-2004 13:48:08	LTR	3,00	300	234	252	0	0,150		0,60
01-12-2004 13:47:44	LTR	3,00	302	96	110	123	0,029		0,89
01-12-2004 13:47:42	LTR	3,00	302	123	132	141	0,041		0,60
01-12-2004 13:47:40	LTR	3,00	302	141	156	259	0,058		0,56
01-12-2004 13:47:17	LTR	RGR	1022	182	214	266	0,368		0,94
01-12-2004 13:46:49	LTR	RGR	1287	112	191	0	0,369		0,97
01-12-2004 13:46:23	LTR	3,00	302	51	73	98	0,013		1,56
01-12-2004 13:46:21	LTR	3,00	302	98	114	125	0,031		0,89
01-12-2004 13:46:19	LTR	3,00	301	125	135	146	0,043		0,70
01-12-2004 13:46:14	LTR	2,45	255	146	154	159	0,047		0,51
01-12-2004 13:46:12	LTR	2,45	255	159	185	0	0,069		1,37
01-12-2004 13:40:30	LTR	3,00	301	109	128	157	0,039		1,59
01-12-2004 13:40:27	LTR	2,45	256	157	163	178	0,053		0,82
01-12-2004 13:40:25	LTR	2,45	257	178	181	196	0,066		0,70
01-12-2004 13:40:22	LTR	3,00	301	196	206	238	0,100		1,40
01-12-2004 13:39:58	LTR	RGR	1259	107	185	227	0,338		0,97
01-12-2004 13:39:29	LTR	RGR	1055	112	164	201	0,223		0,84
01-12-2004 13:39:03	LTR	3,00	302	108	130	148	0,040		1,32
01-12-2004 13:39:00	LTR	2,45	256	148	165	181	0,055		1,29
01-12-2004 13:38:58	LTR	2,45	255	181	195	207	0,076		1,02

Buttons: Delete, Mark, Control measuring, Control measurings, Return

Normally a project will correspond to e.g. felling in a certain section of a forest district and in that case it is practical to make a project for each section being felled. If you work in a big section or in an entire district, it might be advantageous to split up the project into more smaller project, as this will make it easier to survey the various print-outs and it will also make the printing itself faster. The TM2200 can easily work with very comprehensive projects – apart from the fact that the printing will take longer – so it finally the users decision, if he or she wants more small or one big project.

### Creating a new project

In order to create a new project, you must choose "File, New" from the menu line and you must enter a project name.

Then fill in "Name", "District", "Department" and "Sub-department".

Use the button "Tree species" in order to add one or more saved tree species to the project. Use the button "Calibration tables" in order to add one or more saved calibration tables to the project. See in the section below about tree species and calibration tables, how you can save these for use in other



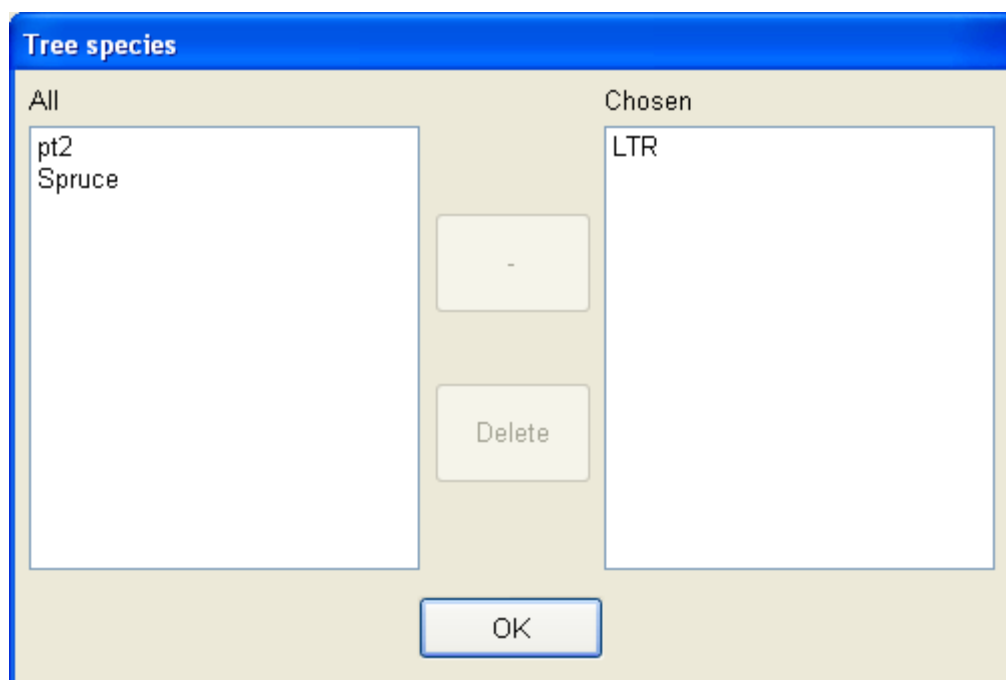
projects.

## ***Editing an existing project***

The project shown on the screen can be corrected and the changes will be saved automatically, when you push the button "Return" or choose "File, Return" in the menu line.

## ***Tree Species***

In the program point "Tree Species", which is activated by pushing the button "Tree species" in "Project, Edit", you can both make tree species available to other projects and you can copy available tree species into a project. By pushing the button "Tree species", the TM2200 will show the following screen:



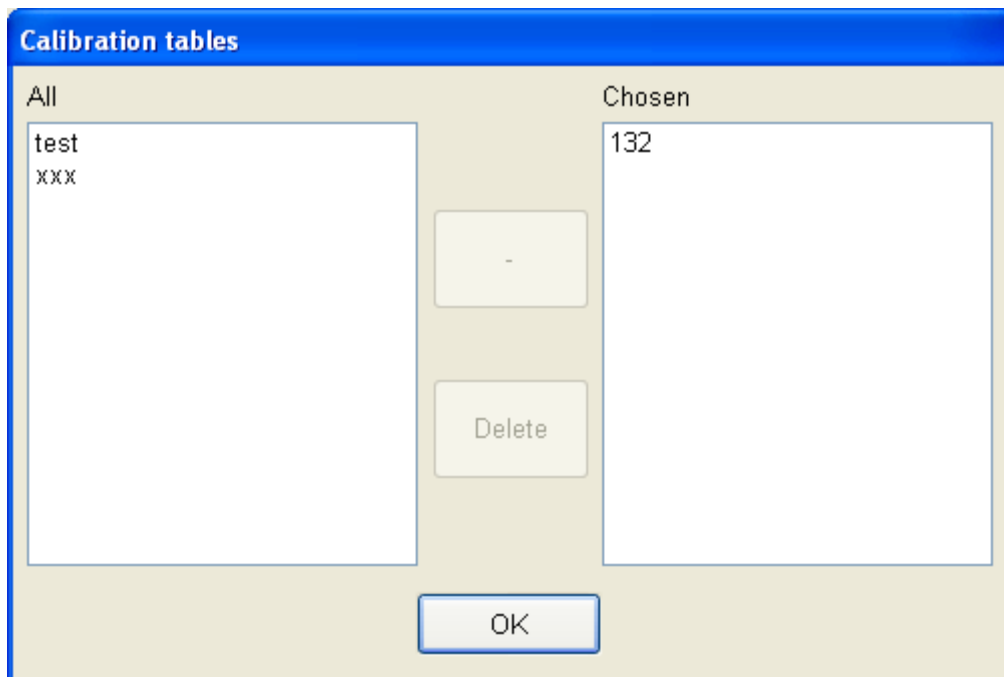
In this screen you can move a tree species from "All" ("All" are the tree species, which have been made available to all projects) to "Chosen", by marking the wanted tree species in the list "All" and pushing the button ">>". You can also make a tree species from the list "Chosen" available to other projects. In order to do this, the tree species must be marked in the list "Chosen" and you must push the button ">>" (the button will change to "<<" to show that the tree species is copied to "All").

You can remove a tree species from the project by marking it in the list "Chosen" and push the "Delete" button.

You can remove a tree species from "All" by marking it in the list and pushing the button "Delete". Then the deleted tree species will **no longer** be available to other projects.

## Calibration Tables

In the program point "Calibration tables", which is activated by pushing the button "Calibration tables" in "Project, Edit", you can both make calibration tables available to other projects and you can copy available calibration tables into a project. By pushing the button "Calibration tables", the TM2200 will show the following screen:



In this screen you can move a calibration table from "All" ("All" are the calibration tables, which have been made available to all projects) to "Chosen", by marking the wanted calibration table in the list "All" and pushing the button ">>". You can also make a calibration table from the list "Chosen" available to other projects. In order to do this, the calibration table must be marked in the list "Chosen" and you must push the button ">>" (the button will change to "<<" to show that the calibration table is copied to "All").

You can remove a calibration table from the project by marking it in the list "Chosen" and push the "Delete" button.

You can remove a calibration table from "All" by marking it in the list and pushing the button "Delete". Then the deleted calibration table will **no longer** be available to other projects.

### How to delete a log

If for some reason a log has been registered and it should not be, it is possible to delete this by marking the line in the database line (Push the line until the arrow to the utmost left moves to the log in question) and push the button "Delete". The TM2200 will ask for a confirmation as an additional security.

### Manual marking of a log

In order to make a manual marking of a log, you must mark the line containing the log you want to mark and push the button "Mark".

## ***Manual test measuring of a log***

In order to make a manual test measuring of a log, you must mark the line containing the log you want to test measure and push the button "Test measuring". Then enter the measured values in the test measuring window.

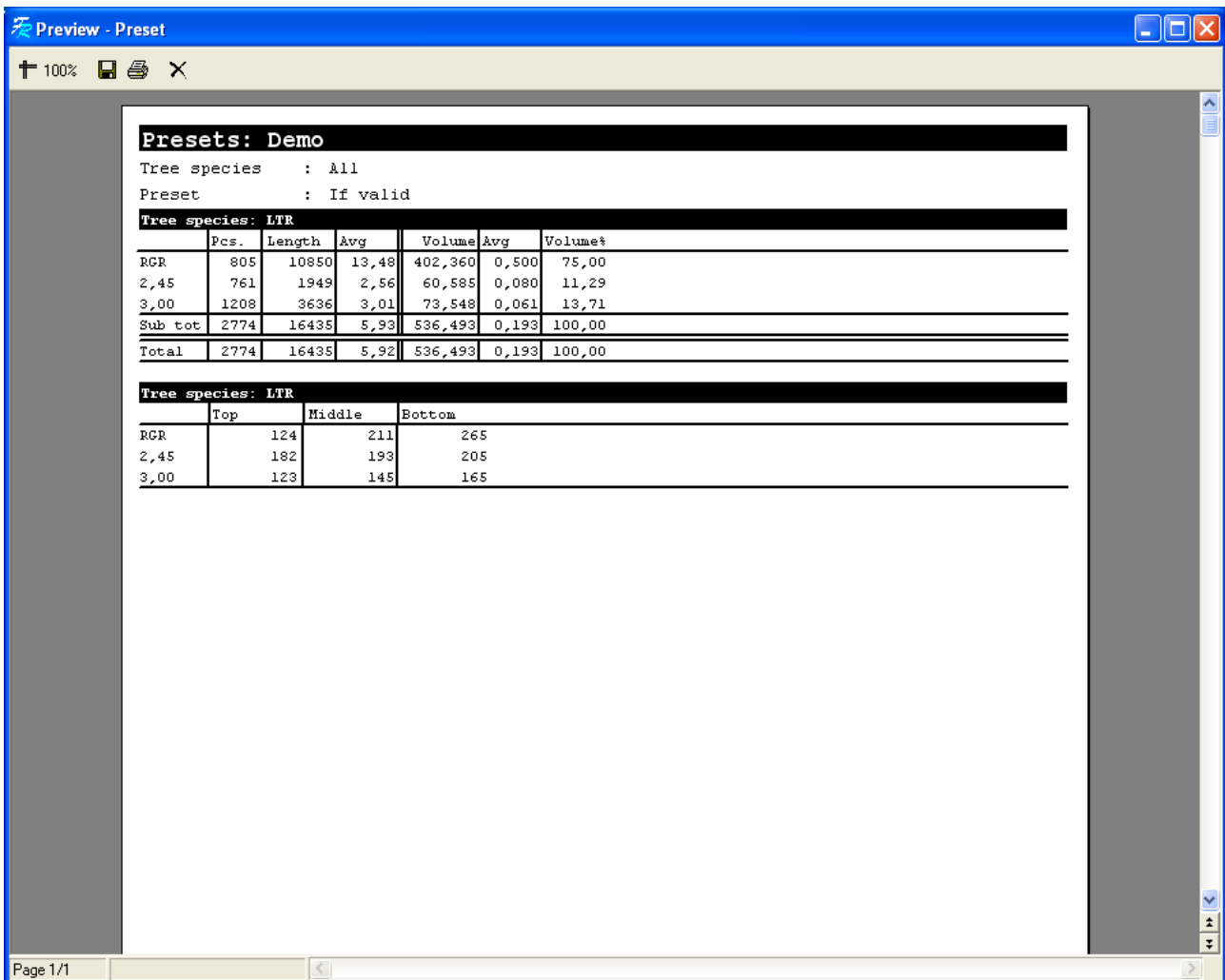
## ***Summaries***

From the menu "Summaries" in the menu line, you can get access to a number of printouts in the TM2200. By pushing the headings of the columns in the database section, you can choose which logs you want included in the various printouts.

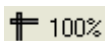
Each printout can also be sent by e-mail by using the sub-menu "Send" and then choose the summary, you want.

## Printout Example

If "Show printout example" in the printer set-up has been chosen, you can see on the screen, how the printout will look. The printout example will be shown as follows (here with the printout "Preset" as example):



The printout is shown on white background. You can roll up and down in the printout with the scrollbar utmost to the right. In the menu line you have a number of symbols, which give some additional functions:



You can zoom in or out on the printout with this button.



With this button you can save the printout on a disc or on the USB memory stick. By pushing this, a window appears, indicating where you can enter the place and the name of the printout. Please note: In order to use the printout on another machine, "File type" in the shown window must be changed to "Text (dot-matrix printer)(\* .prn).



This button must be used for printing out.



With this window you close the window printout example.

## **Diameter-Classes**

This printout shows all the logs chosen, divided into diameter-classes.

## **Preset**

This printout shows production data, divided into tree species and presets.

## **Test Measuring**

This printout shows the test measuring, which were made in the project and the total deviation in volume between the machine measurements and the manual measurements.

## **Summary**

This printout shows a total production summary and statistics and time consumption.

## **Result**

This printout shows a statement of the result of a project, including the production data, divided in tree species and presets.

## **Send**

From the menu "File, Send" you can send a project by e-mail i TM-Office format (TM-Office is additional equipment). You can also send certain StanForD-formats by e-mail.

## **Import**

From the menu "File, Import" you can import a project in TM-Office format (TM-Office is additional equipment).

## **Export**

From the menu "File, Export" you can export data in various formats: TM-Office (TM-Office is additional equipment), StanForD and comma-separated files (CSV). You can also export in PC300 format and a PC300 reduced list.

## **Back-up copying**

From the menu "File, Back-up copying" you can make a back-up copy of the project. Back-up copies secure the user in case of a problem with the computer or with the hard disc. A back-up copy can be restored with the menu point "File, Restore".

## Settings

Under the menu "Settings" you can make various settings in order to make the machine function in exactly the way each individual user wants it. Most points have already been set by your machine supplier and should only be changed by a technician. However, the following points can be set by the user without any negative influences on the functions of the machine.

### Error Surveillance

This point can be chosen with "Settings, Error surveillance" from the menu line. The TM2200 shows the following:

The screenshot shows the 'Error Surveillance' settings interface. It features a list of error types on the left, each with a radio button. The main area contains four encoder settings (Length, Right diameter, Saw, and Left diameter) and a Functional error section. Each encoder setting includes a 'Sequence error' and a 'Pulse error' option, both with radio buttons and input fields. The 'Functional error' section includes options for 'Rollers -> length pulses', 'Open/close -> diameter-pulses left', 'Open/close -> diameter-pulses right', and 'Saw -> Saw out'. A 'Return' button is located at the bottom right of the screen.

In this screen you can decide, which errors you want to be shown, if they should occur when using the machine. In order to activate a warning in case of error, the wanted error must be marked with a cross in the field against the error. For each encoder you can also indicate, how many of the different errors (sequential error and pulsations error) it shall take, before an error is shown.

Please note: Dependent on the harvesting head mounted on the machine, certain error conditions can occur periodically, without indicating an actual error, which makes error surveillance of these functions impossible. The supplier of the harvesting head can inform you of the functions, for which error surveillance cannot be carried out.

## Test buttons

This point can be chosen with "Settings, Test buttons" from the menu line. The TM2200 shows a window with the possibility of activating the spray-functions for "Stump spray", "Saw lubrication", "Colour 1" and "Colour 2". With the test buttons you can make sure that oil or colour respectively has been led to the nozzles, after filling up with oil and colour. A small light marking against each button shows the advancing of the piston (with bright green) and the withdrawal of the piston (with bright red), whereupon a dark green light indicator shows that the button is ready for making e.g. an extra pump.

## Button Set-up

This point is chosen with "Settings, Button ". The TM2200 will show the following:



In this window you can choose, which function you want each button on the machine to have. By pushing a button on the machine, the button in question will be marked in the window and by pushing the button in the window, the wanted function can be chosen from a list.

Please note: Not all machines can carry out all functions, and your machine supplier can inform you of which functions you can use.

## ***Colour***

From the menu "Settings, Colour" you can choose between 5 different colour combinations, some of which are especially for working at night or in the evening because of a lower emission of light from the screen. Others are better when working during the day, because of a higher colour contrast.

## ***Driver Set-up***

This point can be chosen with "Settings, Driver setup" from the menu line. In driver setup you can add new drivers to the machine and the data for the existing drivers can be corrected. Each driver has his own button set-up and colour set-up, so buttons and colours suit each individual driver.

Please note: When cutting, it is recorded, which driver has cut which log. With the TM-Office (TM-Office is additional equipment) you can create printouts, showing production data split up on drivers and other similar printouts.



## **Electronic calliper (Haglöf Digitech Pro)**

In this paragraph it is explained, how to use an electronic calliper with the program and how to set it up in the settings.

### ***Start calibration/Calibration procedure***

Perform these steps to make a start calibration:

1. First, select the wanted calibration table from the "Calibration" menu (or create a new one).
2. Select the item "Calibration procedure" from the "Calibration" menu.
3. Fell a tree and feed the whole tree through the processor (possibly using "Override"), and cut the tree at the top.
4. Release the tree.
5. Select "Shape of Trunk" and "Send to calliper...".
6. Select MEASURING on the calliper and follow the measuring instructions on the calliper.
7. In the cabin, put the calliper into "SEND DATA" mode and place it in the rack.
8. Select "Calibration" and then "Receive from calliper..." (or simply "Receive from calliper" when doing a control measurement) in the program and "KTR-file, KERMIT" on the calliper.
9. Say "Yes" to the question "CLEAR MEMORY" on the calliper and put the calliper into "SERVER" mode.
10. TM2200 will ask if you want to transfer the data to the calibration table: Answer "Yes" to this question to make a new calibration table.

### ***Manual control measurement with electronic calliper***

A manual control measurement can be made any time, provided no tree is in the processor. Select the stem in the list, for which a control measurement is to be made and select "Shape of trunk, Send to calliper...". Measure the stem as described in point 6 to 9 above. Finally, enter a stem number/mark for the measured stem.

### ***Automatic control measurement with electronic calliper***

When the program asks for an automatic control measurement, continue to process the tree until the tree fully processed and then release the tree and select "Send to calliper". Measure the stem as described in point 6 to 9 above. Finally, enter a stem number/mark for the measured stem.

## Error messages and what they mean

### ***HH-Module***

- Ⓞ **"Length encoder: Pulse error"**
- Ⓞ **"Right diameter encoder: Pulse error"**
- Ⓞ **"Left diameter encoder: Pulse error"**
- Ⓞ **"Saw encoder: Pulse error"**

These errors can occur while processing a tree, if the error in question has been ticked off in "Settings" – "Error Surveillance". The error indicates that there are more pulses on one encoder-channel than on the other. The Error can also occur by accidentally when the machine stands still, if the encoder is in exactly the position, where the optical reader records the pulses – e.g. because of vibrations from the machine. If it should occur while processing a tree (i.e. the machine does not stand still), it can be caused by a defect encoder or a bad connection to the encoder.

- Ⓞ **"Length encoder: Sequence error"**
- Ⓞ **"Right diameter encoder: Sequence error"**
- Ⓞ **"Left diameter encoder: Sequence error"**
- Ⓞ **"Saw encoder: Sequence error"**

This error can occur while processing a tree, if the error in question has been ticked off in "Settings" – "Error Surveillance". The error indicates that the pulses come faster from the encoder than the module can manage recording them. The error can be corrected by changing the installation of the module to recording faster pulses (must be made by TM). If the module is set correctly, it can indicate a defect encoder.

- Ⓞ **"Functional Error: Rollers -> Length pulses"**

This error can occur while processing a tree, if the error in question has been ticked off in "Settings" – "Error Surveillance ". The error indicates that "Forward" has been activated, but that it does not result in any changes in the length pulses. It could e.g. occur, if the rollers slip on the tree and normally the driver will discover this before the error is shown. Further the error can be caused by a defect length encoder.

- Ⓞ **"Functional error: Open/Close -> Diameter pulses left"**
- Ⓞ **"Functional error: Open/close -> Diameter pulses right"**

This error can occur while processing a tree, if the error in question has been ticked off in "Settings" – "Error Surveillance ". The error indicates that no diameter pulses occur, although "Open" or "Close" has been activated. It could occur because of an error in the supply voltage for the encoders or a defect encoder.

- Ⓞ **"Functional error: Saw -> Saw out"**
- Ⓞ **"Functional error: Top saw -> Top saw out"**

This error can occur while processing a tree, if the error in question has been ticked off in "Settings" – "Error Surveillance ". The error indicates that there are no pulses from the saw encoder, i.e. the saw does not come out, when "Saw" has been pushed. Can be caused by the saw being stuck or by a defect encoder.

Ⓞ **"Functional error: Roller pressure"**

This error can occur while processing a tree, if the error in question has been ticked off in "Settings" – "Error Surveillance ". The error only occurs if the machine is equipped with physical pressure gauges and indicates that the pressure measured is beyond the minimum- and maximum-values defined by the program. The error can be caused by an error in the oil pressure or in a valve.

## ***UI-Module***

Ⓞ **"Error: Top saw Lubrication"**

Ⓞ **"Error: TM07"**

Ⓞ **"Error: Extra High Pressure"**

Ⓞ **"Error: Saw lubrication"**

Ⓞ **"Error: Stump treatment"**

Ⓞ **"Error: High pressure"**

This error can occur while processing a tree, if the error in question has been ticked off in "Settings" – "Error Surveillance ". The error indicates that there is a short-circuit in an output or that too little power is taken from the output to record that the output is functioning correctly. Dependent on the machine in question, the error can also be caused by an actual error on the machine or it just indicates that the units chosen don't use as much power as was expected from the module (which is not an error).

Ⓞ **"Too many active length intervals in the tree species! XXX deleted"**

There were more active length intervals in the Tree Species chosen than could be contained by the module. You must reduce the number of active length intervals, either by removing some length intervals from one or more presets or by deactivating one or more presets in Tree Species.

Ⓞ **"Too many active diameter intervals in the tree species! XXX deleted"**

There were more active diameter intervals in the Tree Species chosen than could be contained by the module. You must reduce the number of active diameter intervals, either by removing some diameter intervals from one or more presets or by deactivating one or more presets in Tree Species.

Ⓞ **"Too many Matrix-Elements in the tree species!"**

The combination of length- and diameter-intervals in the Tree Species chosen exceeds the capacity of the module. You must reduce the number of concurrent length- and diameter-intervals in one or more presets.

Ⓢ **"Missing interesting diameter at index NNN"**

An internal error occurred in the UI-Module during the calculation of a prediction. This should never occur – please contact Techno-Matic A/S.

Ⓢ **"Matrix corruption NNNN:NNNN "**

An internal error occurred in the UI-Module during of the internal tables. This should never occur – please contact Techno-Matic A/S.

Ⓢ **"Watchdog error: NNN"**

A Watchdog error occurred in the module. This should never occur – please contact Techno-Matic A/S. It could indicate a cable error (especially by serial communication) or a defect module.

## ***PC-Program***

Ⓢ **"TMUI vN.N.N found, but TMUI vX.X.X needed! It is strongly advised you update the modules before proceeding!"**

Ⓢ **"TMHH vN.N.N found, but TMHH vX.X.X needed! It is strongly advised you update the modules before proceeding!"**

This can occur by start up of the program. The message indicates than an older module than needed by the TM2000 v.4.5 to work correctly, was mounted either at the harvesting head or in the cabin. This should never occur, as Techno-Matic takes care that the correct modules are being mounted or delivered in case of replacement/repair.

Ⓢ **"Unable to create project"**

This can occur when making a new project in "Project, Edit". The error indicates that the project cannot be made because a project by the same name exists already. You must choose "File, New" in "Project, Edit" to make a new project with another name.

Ⓢ **"Calibration table: Unable to create XXX "**

This can occur when making a new calibration table in "Calibration, Edit". This error indicates that a calibration table of that name cannot be made, as there is one by that name already or because an invalid name has been chosen. You must choose "File, New" in "Calibration, Edit" to make a calibration table with another name.

Ⓢ **"Illegal calibration table!: Calibration table does not belong to this project!"**

This can occur when starting up the program or when changing to a new project. The error indicates that a calibration table has been copied directly into project in Windows File-Manager. This is not valid – calibration tables must be copied in "Project, Edit" by moving the calibration table into the "common room" and thereafter move it into the new project. The error cannot occur during normal

operation.

Ⓢ **"Calibration table: This name is already in use"**

This error can occur by using "Save as" in "Calibration, Edit". The error indicates that the name chosen has already been used for another calibration table. Choose "Save as" again and enter another name.

Ⓢ **"Calibration table: XXX is in use - it cannot be deleted"**

This error can occur by using the button "Delete" in "Project, Edit" by using the button "Calibration Tables". The error indicates that the user is trying to remove a calibration table from the project, which has already been used in that project. For the sake of the data integrity in the program this error cannot be bypassed.

Ⓢ **"Error 001: Diameter not found"**

This error can occur in "Tree Species, Edit". The error indicates that a diameter cannot be found in the file, where the tree species is preserved. This indicates that a manual correction was made in the file from the Windows File manager or that there is an error on the hard disc. The error cannot occur by normal use unless there is an error in the hard disc.

Ⓢ **"Error 002: Length not found!"**

This error can occur in "Tree Species, Edit". The error indicates that a diameter cannot be found in the file, where the tree species is preserved. This indicates that a manual correction was made in the file from the Windows File manager or that there is an error on the hard disc. The error cannot occur by normal use unless there is an error in the hard disc.

Ⓢ **"Tree Species: Unable to create XXX"**

This can occur when making a new tree species in "Calibration, Edit". This error indicates that a tree species of that name cannot be made, as there is one by that name already or because an invalid name has been chosen. You must choose "File, New" in "Calibration, Edit" to make a tree species with another name.

Ⓢ **"Tree Species: This name is already in use"**

This error can occur by using "Save as" in "Tree Species, Edit". The error indicates that the name chosen has already been used for another tree species. Choose "Save as" again and enter another name.

Ⓢ **"Tree Species: XXX is in use - it cannot be deleted"**

This error can occur by using the button "Delete" in "Project, Edit" by using the button "Tree Species". The error indicates that the user is trying to remove a tree species from the project, which has already been used in that project. For the sake of the data integrity in the program this error cannot be bypassed.

Ⓞ **"Manoeuvre Pattern: Error in number"**

This error can occur in "Tree Species, Edit, Manoeuvre Pattern, New Manoeuvre Pattern/Edit". The error indicates that a text or an invalid number has been entered in one of the sections of the manoeuvre pattern. You must correct the error and press "Return" again.

Ⓞ **"Manoeuvre Pattern: Unable to create XXX"**

This can occur when making a new manoeuvre pattern in "Calibration, Edit". This error indicates that a manoeuvre pattern by the name of XX cannot be made, as there is one by that name already or because an invalid name has been chosen. You must choose "Manoeuvre Pattern, New Manoeuvre Pattern" in "Tree Species, Edit" to make a manoeuvre pattern with another name.

Ⓞ **"Manoeuvre Pattern: This name is already in use"**

This error can occur by using "Save as" in "Tree Species, Edit, Manoeuvre Pattern, New Manoeuvre Pattern/Edit". The error indicates that the name chosen has already been used for another manoeuvre pattern. Choose "Save as" again and enter another name.

Ⓞ **"CAN Driver not found"**

This error can occur when starting up the program and it indicates that the program cannot find the driver for the communication with the USB-CAN unit. This error should never occur when the program has been installed correctly. If it should occur on a system that has worked correctly previously, it indicates a problem with the hard disc.

Ⓞ **"Repair tools not found! Please make sure the installation is complete."**

This error can occur when starting up the program and means that an incomplete updating of the program from an older to a new version has been made. The error is a message to the technician, making the updating and it will therefore be corrected immediately and won't occur during normal operation.

Ⓞ **"Invalid licence"**

This error can occur when starting up the program and means that there is no valid licence for using the program on this machine.

Ⓞ **"Error in number"**

This error can occur by entering an invalid number in the section "Mark", in the section "Test Measuring" and in the sections "Calibration, Length, Length" and "Calibration, diameter". The error can further occur in "Project, Edit" and in the various points of the menu "Settings". You must change the number into a valid number and press "OK" again.

Ⓞ **"CAN driver configuration failed"**

This error can occur when starting up the program. The error indicates that the parameters for the CAN-USB unit could not be written. This error will never occur during normal operation.

Ⓞ **"No tree species chosen"**

The error will be shown when starting up the program or when changing tree species with a button. The error indicates having changed to a tree species, which does not exist in this project.

Ⓢ **"The calibration table XXX does not exist or was copied into the project"**

This error can occur when starting up the program or when changing to a calibration table. The error indicates that a calibration table was copied directly into project in Windows File manager. This is not allowed – calibration tables must be copied into "Project, Edit" by moving the calibration table to the "common area" and thereafter move it into the new project. The error cannot occur during normal operation.

Ⓢ **"Calibration table: Calibration point not valid"**

This error can occur when starting up the program or when changing to a calibration table. The error indicates that there is one or more invalid points in the calibration table or that there are no points at all. Correct or remove the invalid points or change to a valid table.

Ⓢ **"The Printer XXX does not exist – Standard printer is used instead"**

This error can occur when starting up the program or when changing to a new project. The error indicates that a printer was chosen in "Settings, Printer", which could not be found on the computer. Choose another printer in "Settings, Printer".

Ⓢ **"No manoeuvre pattern chosen in the preset"**

The error can occur when changing preset in "Tree Species, Edit" or when "Return" is used in "Tree Species, Edit". The error indicates that no manoeuvre pattern was attached in "Tree Species, Edit" to one or more of the presets made. In order to correct this error, you must choose a manoeuvre pattern for the presets, which don't have any.

Ⓢ **"Please select a driver"**

This error occurs in "Settings, Driver ", when pushing "Return" without having chosen a driver from the list. You must choose a driver (or make one and choose) and push "Return" again.

Ⓢ **"Unable to send mail! Please try again."**

This error can occur in "Project, Edit" by all "Send" functions, if no mail-receiver was chosen in "Settings, General", if the e-mail program was not configured correctly or if the e-mail program was carrying out another operation, when the TM2000 tried to send the mail. You must check that a mail-receiver has been entered in "Settings, General" and that the e-mail program has been installed correctly. If these things are in order, try to send again after a short interval.