



Measurement Devices Limited

Fanbeam®5 Control Software - Multi-Target

Issue #2 - Apr-2012

for
End Users / Installers / Engineers



Measurement Devices Limited
Silverburn Crescent, Bridge of Don, Aberdeen AB23 8EW, Scotland, UK
UK: +44 1224 246700 USA: +1 281 646 0050
<http://www.mdl.co.uk>



————— This page is left Intentionally blank —————





1 Fanbeam®5 Control Software - Multi-Target Document

IT IS IMPORTANT THAT YOU READ THIS MANUAL CAREFULLY BEFORE USING THE SYSTEM.

©Copyright 2010 Measurement Devices Limited.

Reproduction in whole or in part, including utilisation in machines capable of reproduction or retrieval, without the express written permission of MDL is prohibited. Reverse engineering is also prohibited.

Software Version 2.00 and above.

©Copyright 1988 – 2010 Measurement Devices Limited.

The programs that control this product are copyrighted and all rights are reserved. Reproduction, adaptation, or translation of those programs without prior written consent of Measurement Devices Limited is prohibited.

The information in this manual is subject to change without notice.

Some names referred to within this document are trademarks.

1.1 Document Revision History

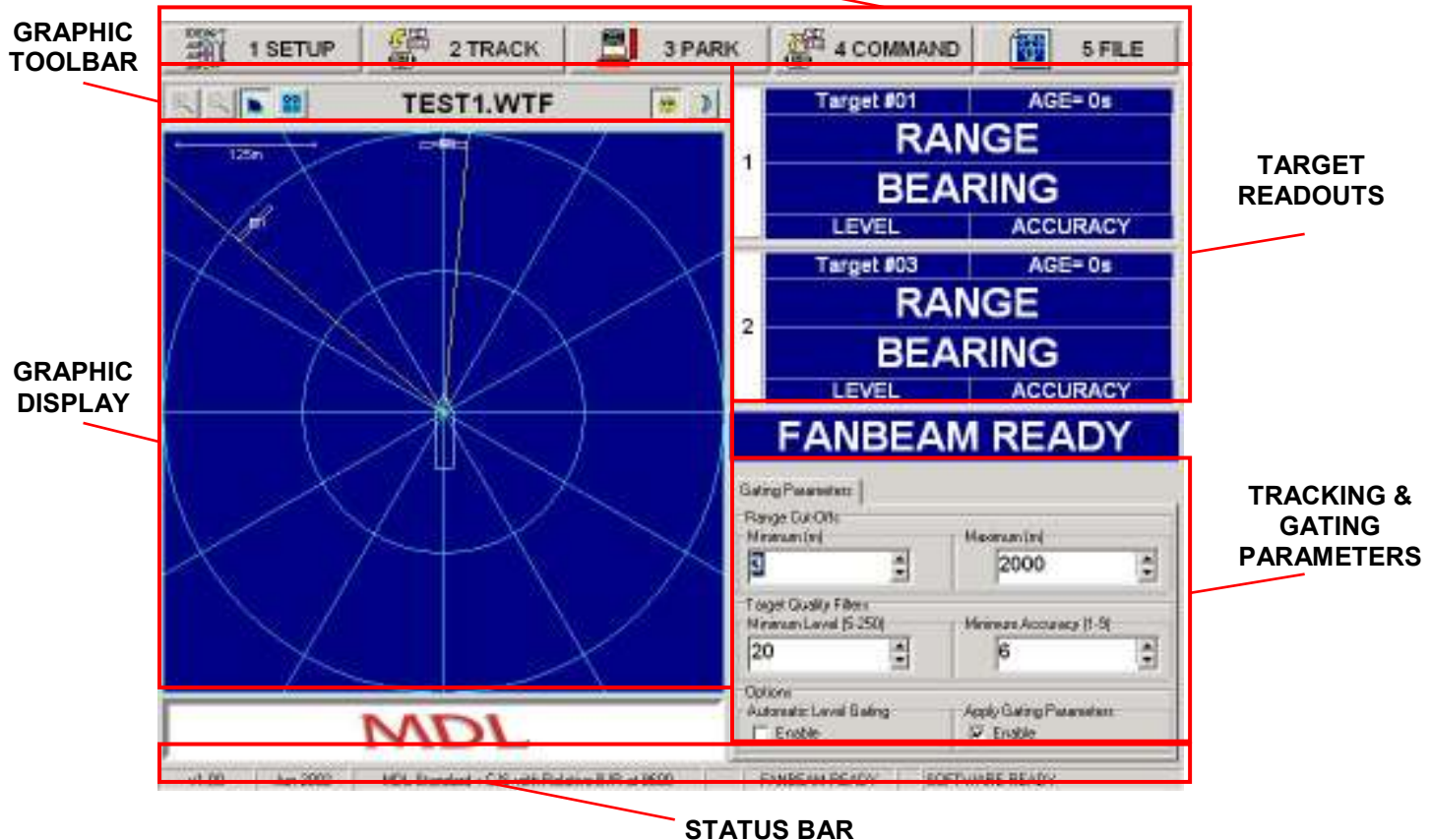
Issue	Date	Initials	Notes
1	Dec 2010	KSP	
2	Dec 2011	HC	

2 Control Software - Multi-Target

2.1 The Main Display

Once the UCU has been powered on and has gone through the operating system boot up process, the Fanbeam software will run and produce the following display:

MENU BUTTON BAR



The screen display is separated into various sections as indicated above. These are:

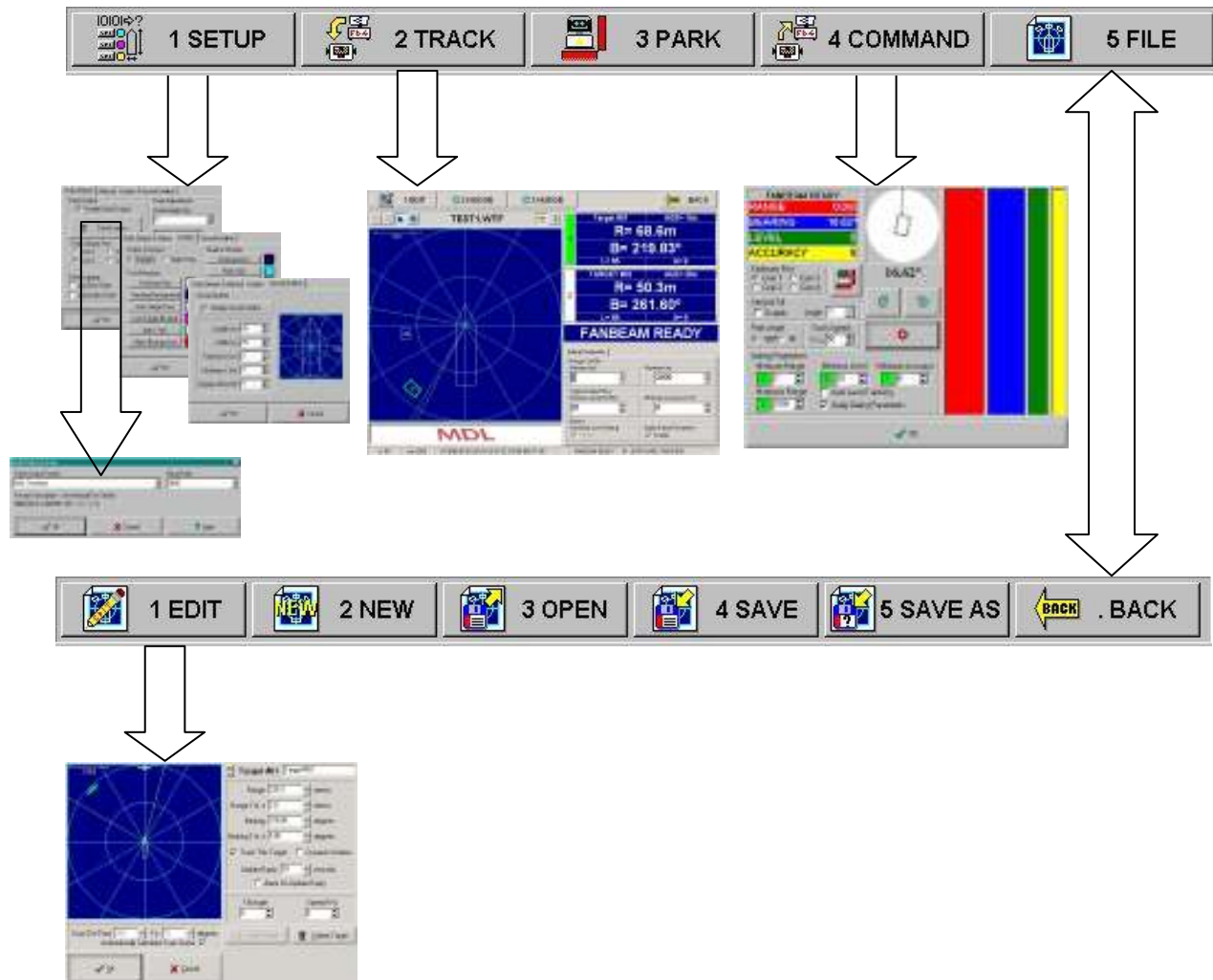
- **MENU BUTTON BAR**
This area contains the buttons associated with the main functions of the software. Target File manipulation and tracking is done using these numbered buttons.
- **TARGET READOUTS**
Large, coloured text readouts of range, bearing, level, accuracy and age.
- **GRAPHIC DISPLAY**
Scaled plan view centred about the Fanbeam. Graphically presents targets, a vessel outline, scale annotations and a target vessel outline.
- **GRAPHIC TOOLBAR**
Buttons to allow manual zooming or auto-scaling of the graphic display and colour scheme selection. Also displays Target File name.
- **TRACKING AND GATING PARAMETERS**
Online parameters to aid with target acquisition and tracking.
- **STATUS BAR**



Displays data output, Fanbeam status and Target File name.

The following section of the manual is split into four parts, which document the main functions of the software. These functions are Setup (section 2.2), Track (section 2.4), Park (section 2.5), Command (section 2.6) and File (section 2.3).

NOTE: Whilst these sections deal mostly with interaction with the software, there are also some important operational points relating to the configuration of the hardware.



2.2 Setup

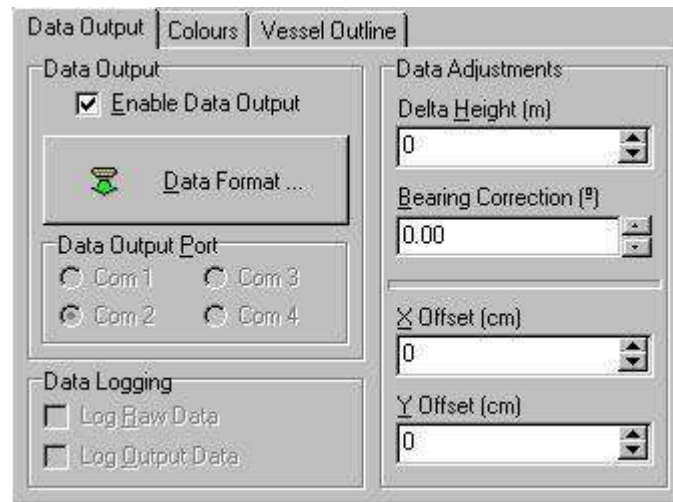


There are a number of initial setup options that are configured in the software. To access these options, click the Setup button from the **MENU BUTTON BAR** or press the 1 key. This action will display the setup dialog at the bottom left of the display. There are four tabs which each contain logical groupings of settings. These are as follows:

NOTE: All setup options are saved to disk when accepted and so are retained after a restart.

2.2.1 Data Output

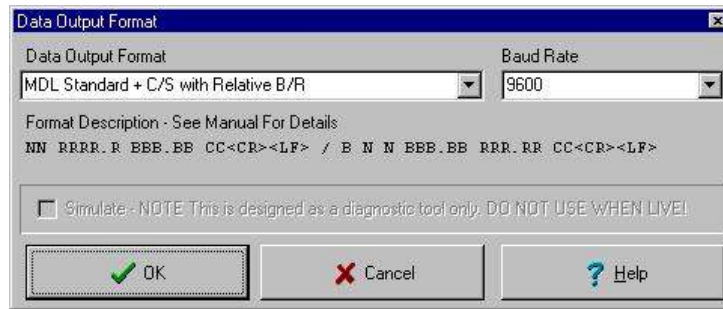
The data output tab contains all of the settings that pertain to data that is produced and output by the software.



- **Enable Data Output**
This checkbox toggles on and off the output of serial data from a secondary serial port.
- **Data Format**
Clicking this button takes the user to the data output format dialog, which allows selection of different data strings and baud rates for interfacing purposes.
- **Data Output Port**
Allows selection of a serial port for data output.
NOTE: This option is always set to COM2 for users of an embedded control system.
- **Log Raw Data**
This checkbox toggles on and off an ASCII log file of all target data coming from the Fanbeam. This should only be used over short time periods as a diagnostic tool.
NOTE: This option is not available on legacy control systems.
- **Log Output Data**
This checkbox toggles on and off a log file of output data being sent from the software. This should only be used over short time periods as a diagnostic tool.
NOTE: This option is not available on legacy control systems.

2.2.2 Data Output Formats

The Single Target DP software was first implemented as a DOS program in the early 1990's. Over the years, the software has gone through various modifications and has been interfaced to many different DP consoles. The result of this is that a variety data formats are available. The exact details of these formats can be found in the Installation & Commissioning Guide.



Selection of the required data format is done by means of a drop down list. The baud rate is also selectable from standard speed between 1200bps and 57600bps. The normal baud rate for most of the formats is 9600bps.

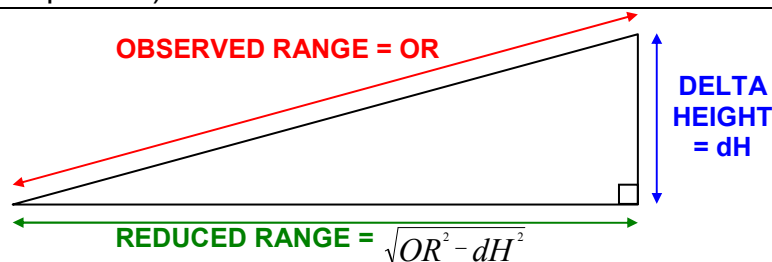
NOTE: Users should contact the suppliers of their DP consoles before attempting to connect or interface a new reference system. Some consoles are not capable of taking a Fanbeam® input without hardware and/or software modifications.

2.2.3 Data Adjustment Parameters

• Delta Height

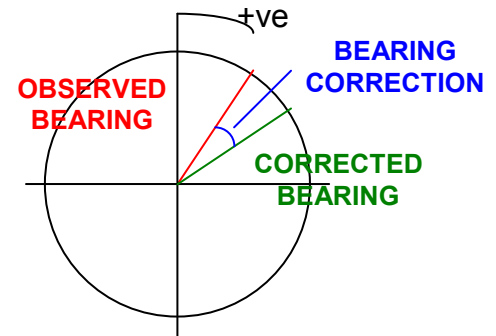
This parameter is used to automatically reduce slope distances, accounting for a significant height difference between the Fanbeam and the target. This need only be used where the measured range needs to be accurate. Many DP situations do not require an exact range to the target, just a repeatable one. Therefore, this parameter should only really be used when advised.

NOTE: If this parameter is non-zero, then the range is reduced before being displayed (i.e. the "raw" range is manipulated).



- Bearing Correction**

This parameter is used to offset the bearings measured by the Fanbeam. Every bearing observed by the Fanbeam is automatically incremented by the bearing correction value. Most installations should have the Fanbeam mounted with its zero angle parallel to the ships head, but a horizontal adjustment can be implemented in the software using this setting.

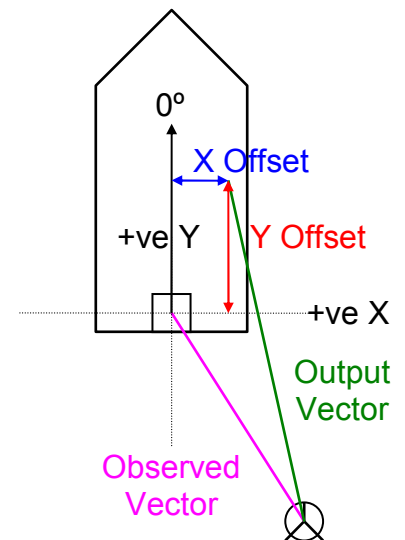


NOTE: If this parameter is non-zero, then the bearing is offset before being displayed (i.e. the “raw” bearing is manipulated).

- X Offset / Y Offset**

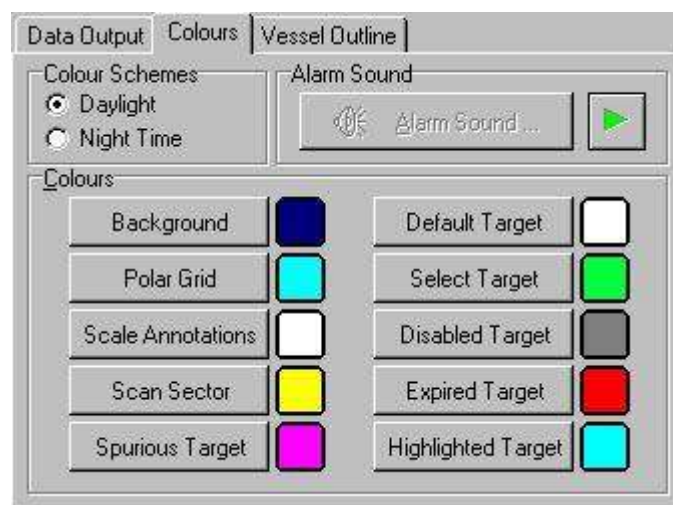
These parameters are used to offset output data to reflect a different Fanbeam position to the actual one. This could be used to align the range/bearing output data to another sensor or location on the vessel where it is not possible to mount the Fanbeam.

NOTE: These parameters only effect the output data and not the on-screen or “raw” data. Assuming that the Fanbeam is mounted such that it's 0° points to the bow of the vessel then the following schematic applies:



2.2.4 Colours

The colours tab contains settings that allow the user to configure the colours of many of the user interface components.

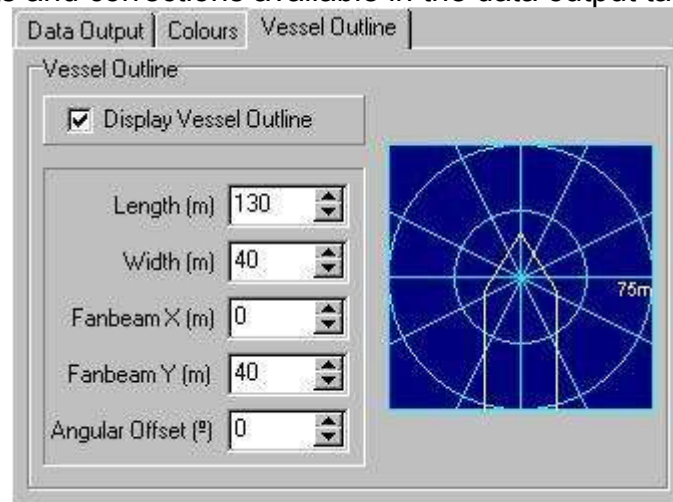


There are two colour schemes available for user customisation, which can be toggled by buttons on the **GRAPHICS TOOLBAR** when tracking a target. The two schemes are called “Daylight” and “Night Time”.

- | | |
|---|--|
| <ul style="list-style-type: none"> • Background
Colour of Graphics Display and Readout Text background. • Polar Grid
Colour of Graphics Display grid. • Scale Annotations
Colour of scale text and vessel outlines. • Scan Sector
Colour of scan sector. • Spurious Target
Colour of target that is out-with any target window. | <ul style="list-style-type: none"> • Default Target
Colour of normal target & window. • Select Target
Colour of last observed target & window. • Disabled Target
Colour of disabled target & window. • Expired Target
Colour of expired target & window. • Highlighted Target
Colour of user selected target & window. |
|---|--|

2.2.5 Vessel Outline

The vessel outline settings tab allows the user to create a graphical representation of the vessel and position it relative to the Fanbeam. It should be noted that this is a graphical tool only and has no relationship with the offsets and corrections available in the data output tab.

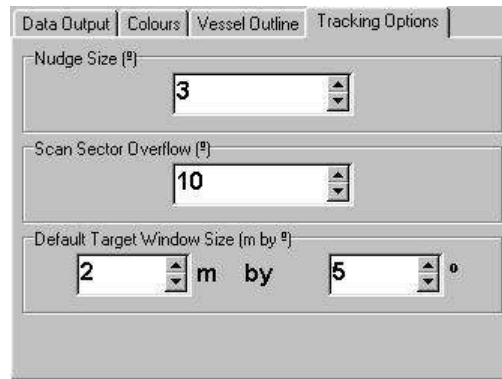


- **Display Vessel Outline**
This checkbox toggles on and off a boat shape on the **GRAPHIC DISPLAY**, which is centred about the Fanbeam.
- **Length**
This parameter is the length of the vessel outline (bow to aft) and should be approximately equal to the length of the actual vessel.
- **Width**
This parameter is the width of the vessel outline (port to starboard) and should be approximately equal to the length of the actual vessel.
- **Fanbeam X / Fanbeam Y**
These parameters are used to position the vessel outline relative to the Fanbeam, which is at the centre of the outline when they are both zero. Normally the Fanbeam will be on the centre line and will only have a Y offset. Positive X is towards the starboard and positive Y is towards the bow.
- **Angular Offset**
This parameter is used to rotate the outline around the Fanbeam. Normally the Fanbeam zero axis will be parallel to the centre line and this value will be zero. Positive is clockwise.

The vessel outline is drawn to scale on the **GRAPHIC DISPLAY** so an accurate model will aid with target identification.

2.2.6 Tracking Options

This page of the Setup Dialog contains parameters related to the acquisition and tracking of multiple targets.



- **Nudge Size**

This control allows the user to specify the angle that the scan sector can be “nudged” by when tracking. A small value is recommended to allow for fine adjustment.

- **Scan Sector Overflow**

This value defines the angle that is added onto either end of an automatically generated **SCAN SECTOR**. See the following example for more details:

- Two targets with bearings of 90° and 110° respectively are found.
- They both have a bearing Tolerance of 5°.
- This would define a **SCAN SECTOR** of 85° to 115°.
- With the Scan Sector Overflow set to 10° the **SCAN SECTOR** becomes 75° to 125°.

This parameter is used to create a “generous” **SCAN SECTOR** when acquiring thus providing room for the targets to move within the area being scanned by the Fanbeam®.

- **Default Target Window Size**

These parameters are used when automatically creating targets to define the window around the target. The user can modify these values for each target individually by editing the **TARGET FILE**.

2.3 Target Files



Before tracking can be initiated, a “Target File” must be loaded if one is not already. To access the functions that relate to the Target File, click the File button from the **MENU BUTTON BAR** or press the 5 key. This will display the **FILE MENU BUTTONS**, which appear as below:



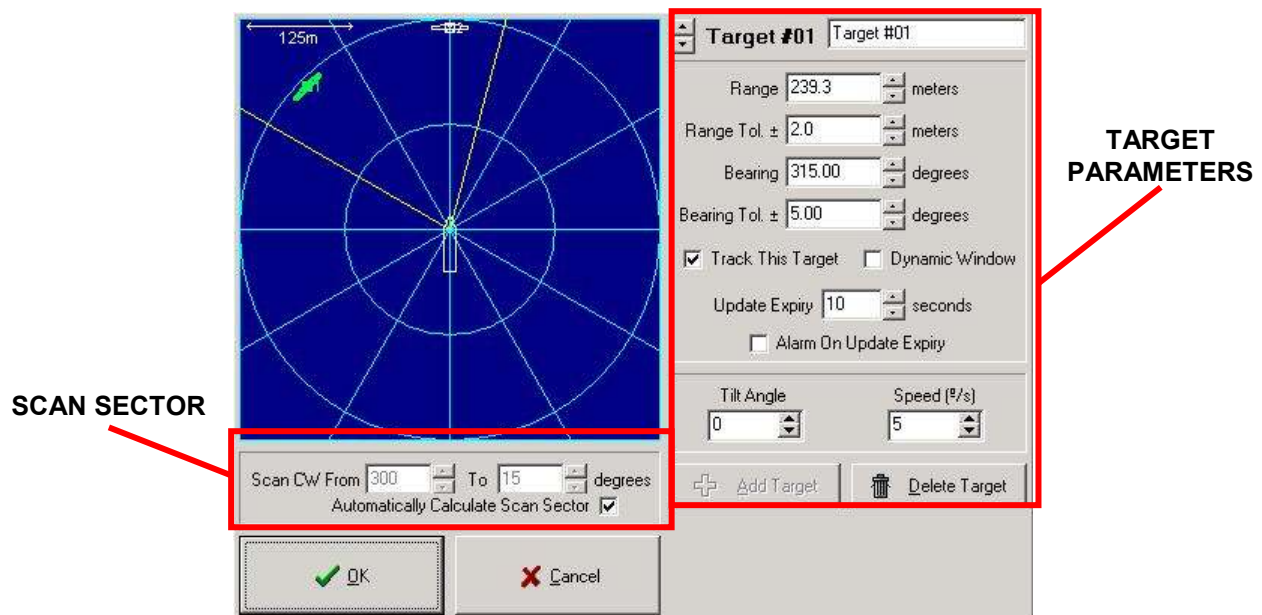
The back button returns the user to the Main Menu.

The various file functions are explained below:

2.3.1 Target Files – Edit



Clicking the Edit button or pressing the 1 key when in the File Menu displays the following dialog:



The **TARGET FILE** edit dialog allows the user to manipulate almost all of the parameters that relate to a given configuration of targets. A maximum of four (4) targets can be stored in a **TARGET FILE**, each with unique **TARGET PARAMETERS** as follows:

- **ID**
Name for the target to aid in user target recognition.
- **Range**
Starting range of the target from the Fanbeam®.
- **Range Tol±**
Defines the size of the window in the range axis (polar).
- **Bearing**
Starting bearing of the target from the Fanbeam®.
- **Bearing Tol±**
Defines the size of the window in the bearing axis (polar).
- **Track This Target**
This option allows the user to disable a target without renumbering the others.
- **Dynamic Window**
The Range and Bearing tolerances define a window around the target. If this option is set, the window will follow the target as it moves, alternatively, the window will remain static and centred about the start range and bearing.
- **Update Expiry**
Unless this value is set to zero, the associated target will be deemed expired if it is not observed for a time period greater than the value in seconds. If a target expires, it will turn red and will NOT be included in the data output.
- **Alarm On Update Expiry**
If this option is set, then an audio alarm will be played when the associated target expires.

There are also buttons to allow the user to ADD and DELETE targets. To add a new target, simply click the ADD button and a keyboard dialog will appear, allowing the user to input a target ID using the pointer input device (the UCU has only numeric keys).



Deleting a target will re-number all targets having an ID number higher than that of the deleted one.

The **TARGET FILE** also contains further information as follows:

SCAN SECTOR:

- **Scan CW From**
The starting angle for the scan sector of the Fanbeam®.
- **To**
The second angle that the Fanbeam® will scan between.
- **Automatically Calculate Scan Sector**
If enabled, this option allows the software to calculate a scan sector such that all targets are included.

All of the above values can be edited whilst tracking, allowing great flexibility.

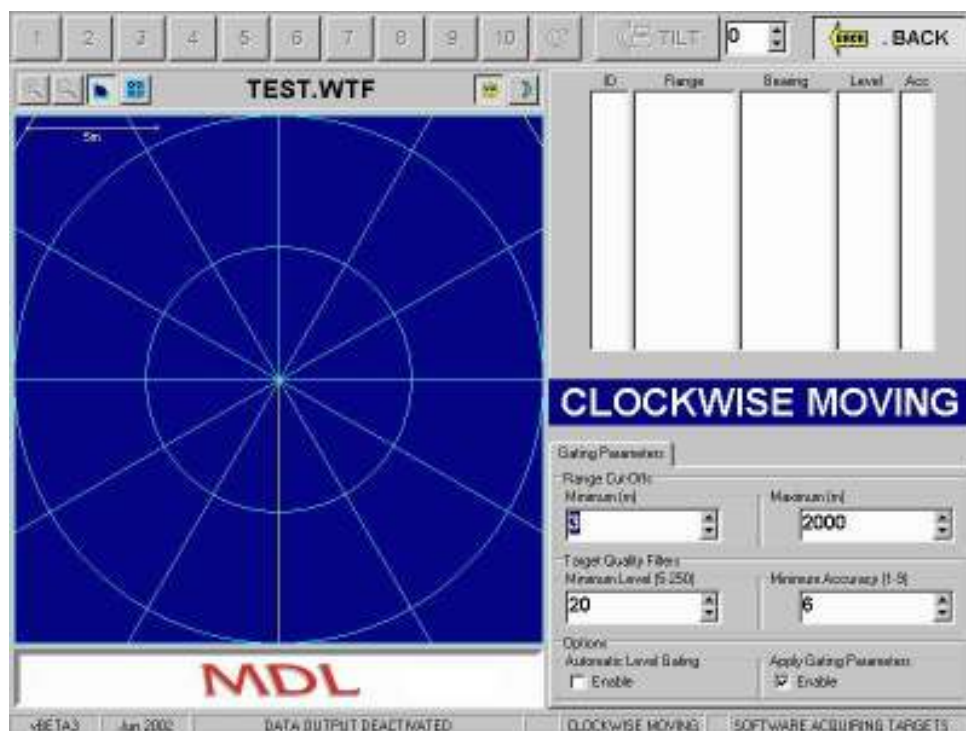
2.3.2 Target Files – New



Every new docking or loading position will require it's own **TARGET FILE**. These files can then be re-used at a later time by loading them back from disk.

On clicking the NEW button or pressing the 2 key will display the keyboard dialog as above, allowing the user to input a filename for the new **TARGET FILE**. Once this is accepted, a save dialog will appear with the filename entered. If the file already exists the user will be prompted before the file is overwritten.

Once the filename has been accepted, the software will prompt the user to scan for targets. If the user selects Yes, the Fanbeam® will then perform a 360° sweep and any targets which are observed and do not infringe the gating parameters will be displayed.



If the targets required are found, then the user can select them and they will be added to the **TARGET FILE**. If the targets are not seen, the user can adjust the **GATING PARAMETERS**, and/or tilt the Fanbeam® then reacquire to see if the required targets can be observed. Once the targets are selected, a scan sector is automatically generated and the software will offer to start tracking straight away.

If, after creation, the acquire option is skipped, then the Edit dialog is displayed to allow the user to modify and confirm the settings. These are then saved to disk.

2.3.3 Target Files – Open



The open button is used to load a **TARGET FILE** from disk. If no file is loaded, then tracking cannot commence. On clicking this button, an open dialog appears, displaying a list of existing **TARGET FILES** and the user can then select one to load. It should be noted that the default directory for **TARGET FILES** is C:\MDL_DATA.

2.3.4 Target Files – Save / Save As



Once a **TARGET FILE** has been modified using the edit feature, the changes should be saved to disk for easy recall at a later time. The Save button is only enabled when the current file has been modified, and clicking it will write the file to disk using the current filename.

If the user wishes to create a copy of an existing **TARGET FILE** using a different filename, the Save As button should be used. This will save the current file using the filename entered into the keyboard dialog.

2.3.5 Target Files - Delete



As there is only a finite amount of disk space available on the UCU, it may be necessary to free up space from time to time by deleting old or obsolete data files. Press 6 from the File menu and the user will be prompted to select a **TARGET FILE** for deletion. The user must confirm the selection before the file is erased completely.

If the disk is running low on space (<0.5Mb) then a warning will appear each time a **TARGET FILE** is created or saved.

2.4 Track



To initiate the tracking of a particular set of targets with the Fanbeam, click the track button from the **MENU BUTTON BAR** or press 2.

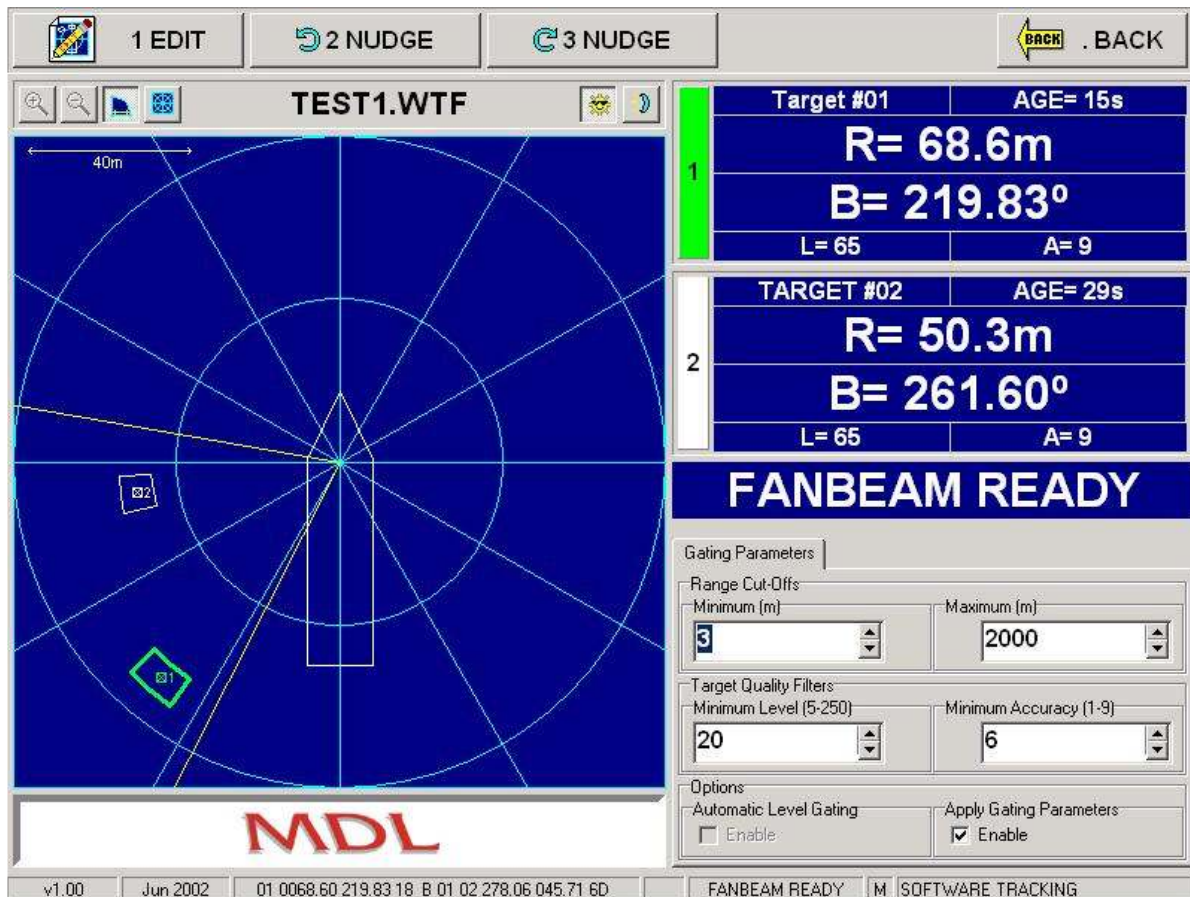
There are two conditions to be satisfied before target tracking can be achieved:

1. A valid **TARGET FILE** must be loaded.
To find out how to load a target file, please refer to section 2.3.3.
2. The scan sector must be set such that the bounding values are not equal.
To find out how to set the scan sector, please refer to section 2.3.1

Assuming that these conditions are met, clicking the Track button will have the following result:

- The Fanbeam® shall be moved to the most counter-clockwise limit of the scan sector and begin scanning back and forth at the speed specified in the **TARGET FILE**.
- As targets are seen by the Fanbeam®, they will be displayed and information on screen shall be updated.
- Data from the target observations shall be sent to the tertiary system using the telegram selected in the setup.

The display will then look something like this:



Whilst tracking, the software will display target information textually and graphically to allow the user to quickly and easily see what is happening. The last seen target will be highlighted in green (or whatever colour is chosen for Select Target in the setup).

Once tracking, the system should require little intervention (assuming the parameters have been set appropriately for the given situation). The following options are, however, available during tracking:

1. Manipulate the **GATING PARAMETERS**.
2. Edit **TARGET FILE**.
3. Manipulating the **GRAPHICS DISPLAY**.
4. Back – allowing the user to stop the Fanbeam® from tracking and return to the **MAIN MENU**.

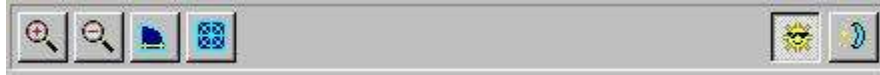


Measurement Devices Limited
Fanbeam®5 Control Software - M

2.4.3 Manipulating the Graphic Display

The software normally scales the **GRAPHIC DISPLAY** to accommodate the target being tracked and its associated window. Using the buttons in the **GRAPHIC TOOLBAR**, users can customise the display as required.

The buttons are (from left to right) as follows:



- **Zoom In**
Allows users to manually select a more detailed scale for the **GRAPHIC DISPLAY**.
- **Zoom Out**
Allows users to manually select a less detailed scale for the **GRAPHIC DISPLAY**.
- **Dynamic Display Scale**
Toggles on and off automatic display scaling. When this is on, the zoom buttons are unavailable.
- **Centre Display**
Re-centres the **GRAPHIC DISPLAY**. Users can move the display by right clicking and dragging on it with the pointer.
- **Daylight Colour Scheme**
Sets the colours to the Daylight Scheme.
- **Night Time Colour Scheme**
Sets the colours to the Daylight Scheme.

2.5 Park



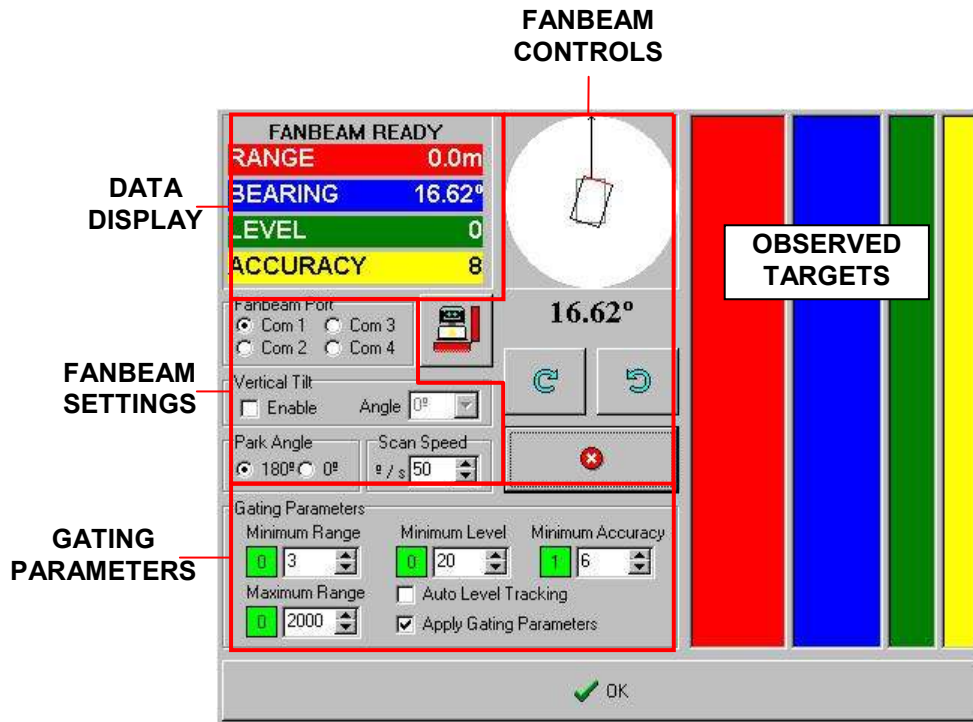
This function allows the operator to “park” the laser head at 180° prior to de-mobilisation of the equipment. If this is not done, the equipment may not fit inside the transit case.

2.6 Command – Fanbeam Setup And Offline Control

The Fanbeam settings must be configured once the system is installed to tell the software how the hardware is interconnected.



Clicking on the Command button on the **MENU BUTTON BAR** or pressing 4 displays the following dialog:



2.6.1 The Fanbeam Settings

- **Fanbeam Port**

Serial port to be used for communication with the Fanbeam must be different to the data output port.

NOTE: This option is disabled on an embedded control system.

- **Tilt**

If an AUTOTILT Fanbeam is used, the user can tilt the head of the laser up or down in 5° increments between +15° and -15°.

- **Park Angle**

This option allows the user to specify the “Park” angle. Users should note, however, that for shipping purposes, the 180° option must be used.

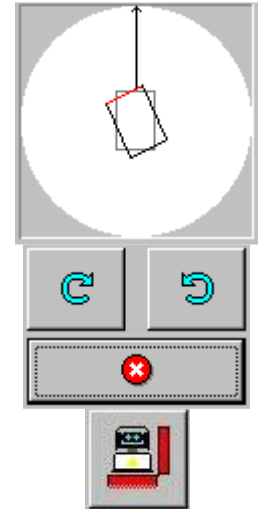
- **Speed**

Sets the rotational speed of the Fanbeam in degrees per second.

Once happy with the **FANBEAM SETTINGS** the user should be able to use the **FANBEAM CONTROLS** to manipulate the instrument.

2.6.2 The Fanbeam Controls

- The plan view circle depicts a plan view of the Fanbeam in a white circle. The mouse can be moved over this circle to select a bearing to move the Fanbeam to or scan between. Once the desired bearing is shown on the display below the circle, left click to move the Fanbeam to that bearing, or right click to start scanning between the chosen bearing and the current bearing.
- The run buttons allow the user to set the Fanbeam running continuously in a clockwise or counter-clockwise direction.
- The stop button cancels any of the above commands.
- The park button moves the Fanbeam to the 180° position that is used for shipping the instrument.



Once the Fanbeam is moving, any information for targets that is observed will appear in the **OBSERVED TARGETS** area and the **DATA DISPLAY**. Some targets may be ignored if they infringe the **GATING PARAMETERS**.

2.6.3 The Gating Parameters

These parameters are replicated on the main display and can be modified at any time. See section 6.5 for more information on how and when to use these settings.

- **Minimum Range**
Any targets with a range lower than this value are ignored by the software.
- **Maximum Range**
Any targets with a range higher than this value are ignored by the software.
- **Minimum Level**
Any targets with a level lower than this value are ignored by the software.
- **Minimum Accuracy**
Any targets with an accuracy lower than this value are ignored by the software.
- **Auto Level Tracking**
A target's level is dependant on many outside factors such as weather conditions and visibility. If this option is checked the level gate will remain lower than any observed target level.
- **Apply Gating Parameters**
This control allows the user to toggle on and off all of the gating parameters. When this option is unchecked, all observations will be considered as real targets. With this option checked, any observations that fall out-with the gating parameters will cause an "infringement". The coloured status indicators next to each gating parameter show gating infringements. The values shown are counts of each infringement since the scan began. These indicators will let the user know if the gating parameters are set too high.

