MARTIN TRACKPOD

2.0BETA

Getting Started

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Printed in Canada

Fifth Edition: November 2001.

Contents

General warnings

1. The TrackPod is not for domestic use.
2. Use the device only as described in this manual.
3. Do not expose it to rain or moisture.
4. The TrackPod controller does not have an ON/OFF switch. It turns ON automatically when it is connected to the mains. Therefore, before connecting, please make sure to switch the TrackPod controller's power to 115 or 230V according to your needs.
5. Make sure the device is properly grounded.
6. Immediately repair or replace damaged power cords.
7. There are no user-serviceable parts inside; refer all service to a qualified technician.

Laser information

The TrackPod contains a class 3A laser calibrator with a 5mW maximum power output. It is located below and protruding from the TrackPod's general-purpose attachment plate, between the two counterweights and within a grounded enclosure (see Figure 1 in the next page). The only aperture through which laser light is emitted is directly in the centre of the grounded enclosure, with the beam being colinear with the attachment plate.

The laser produces an intense, highly directional beam of light. It is needed only briefly during the TrackPod calibration procedures and cannot be turned on during normal operation. The TrackPod's laser will only turn ON when all the following conditions are met:

1. The TrackPod is powered on.
2. The laser is connected to the TrackPod controller.
3. The TrackPod is connected to the control PC.
4. The TrackPod software is running in the control PC.
5. The TrackPod is in the automatic calibration mode. *Tip: you may block access to this mode to prevent unauthorized operators from calibrating the instrument. Set the appropriate access priviledges in the preferences screen of the TrackPod software.*
6. The laser aperture is not blocked by a lid or cap.
7. The F3 button in the TrackPod controller is pressed. Releasing the F3 button stops laser emission.

Laser safety

1. DO NOT STARE INTO THE BEAM OR VIEW DIRECTLY WITH OPTICAL INSTRUMENTS. Extended direct exposure can result in damage to the eyes.
2. The laser should never be used while other people are walking around the stage, unless they are wearing protective goggles.
3. Avoid pointing the laser at mirrors or reflective surfaces.
4. Only qualified and trained employees approved by a laser safety officer should be assigned to install, adjust and calibrate the TrackPod.
5. When not in use, the TrackPod should be stored safely out of reach of unauthorized personnel.
6. Do not remove the warning label on the TrackPod's general purpose attachment plate.
7. Consult local and state laws regarding laser use and possible registration requirements.
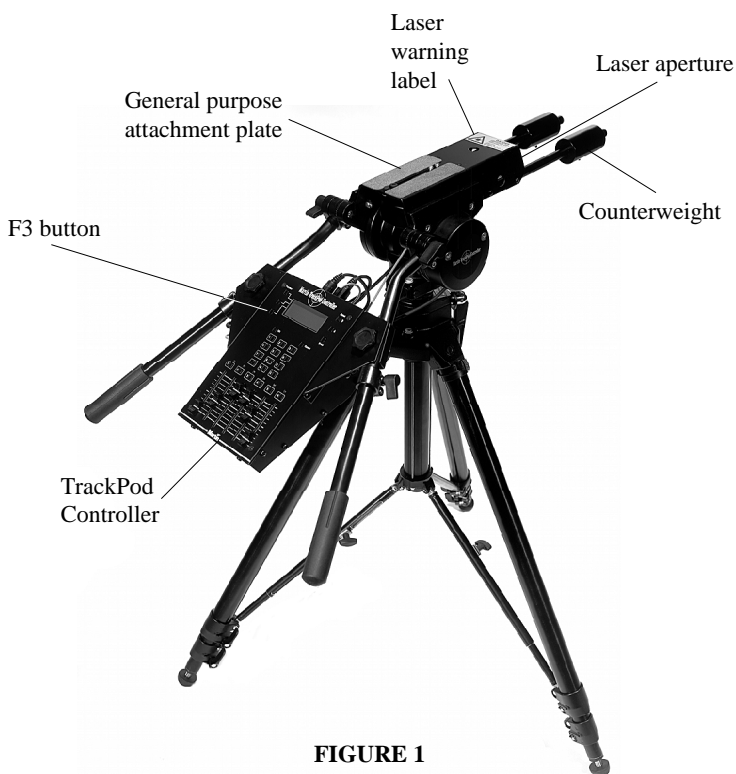8. Do not open the laser enclosure under any circumstances.

FIGURE 1

Welcome!

Thank you for purchasing the Martin TrackPod, the World's most sophisticated automated followspot tracking system. This booklet contains introductory information on how to set up and use your system.

To get the most out of the TrackPod, like with any other sophisticated controller, the lighting designer or technician will need to familiarise him or herself with the system. You may want to receive training from your Martin dealer in order to learn the TrackPod thoroughly. In addition, please read this booklet in its entirety and look over the rollover tips and informative memos that appear in the TrackPod software.

What's included with the TrackPod package?

1 CD-ROM with software and utilities
1 Getting Started booklet
1 TrackPod ISA card with TrackPod and DMX connectors
1 TrackPod controller with switchable power supply and cables
1 sensor head with laser calibrator
4 Laser reflectors for calibration
1 Tripod
1 Flight case

What's NOT included with the TrackPod package?

A PC compatible computer
DMX cables
A sighting device such as a video camera, telrad or scope.
A TrackPod PC card for portable computers (sold separately)
Additional DMX cards to increase the channels from 512 to up to 3584

Software installation

The TrackPod software is supplied in a CD-ROM. Insert the CD-ROM and double-click on the "Setup" icon. This will run a wizard that will help you install the software.

You may also download the most recent software from the Martin website www.martin.dk. This may be useful if you do not have a CD-ROM reader in your TrackPod PC as you may download the software in a zipped format that can fit into a few 3.5" diskettes. You may use the software without installing the TrackPod hardware.

The minimum PC requirements to run the software are:

Operating System:	Windows 95, 98, ME, NT, 2000 or XP
Processor:	Pentium III 500
RAM:	32 MB RAM
Hard disk:	10 MB disk space
Display:	800 x 600 pixels, 16-bit (high colour)
Mouse:	2-button mouse
Expansion Slot:	one 8-bit ISA slot.
PCMCIA Slot:	for optional laptop compatibility
Video card:	nVidia GeForce 2 or 3 recommended

TrackPod card installation

The TrackPod card is an 8-bit ISA card that needs to be inserted into your PC. Make sure the PC is turned off and its power cord is unplugged from the wall. Remove the PC chassis cover as discussed in your PC owner's manual. Locate an ISA bus card slot and insert the TrackPod card in it, making sure that the card is nestled all the way into the slot. Secure the card by screwing the card's bracket to the computer chassis.

Please note: the TrackPod card is very sensitive to electrostatic charges. When it is not in the PC, keep the card in the anti-static bag provided.

The TrackPod card is a memory mapped I/O device with a default memory setting of $D0000. To verify that this memory is free in your PC do the following:

Right-click on "My Computer" icon
On the pop-up menu that appears, select "Properties"
Select the "Device Manager" tab
Click on the "Properties" button
Click on the "Memory" radio button

This will open a window that details the memory assignments for the installed hardware. The default address of the TrackPod ISA card is $D0000 - D0FFF. If this is not free, check which memory space is

available and use the card's dip switches to set that address. Since the TrackPod card is based on Martin's 4064 card you can obtain detailed instructions on setting the address at
 http://www.martin.dk/service/manuals/4064inst.pdf

Please note that in the great majority of cases the default address is fine. If you are aware that other hardware in the PC is using the TrackPod default address, or if you are experiencing unexpected system crashes, then perform this procedure.

Tip: Shadowing should be disabled for the TrackPod card's memory address. This is done by visiting your PC's BIOS, typically under the heading "BIOS Features Setup".

TrackPod assembly

Figures 1 and 2 show the parts of the TrackPod. Unfold the tripod as widely as possible and set it to a comfortable height. Screw the Track-Pod head on the tripod until it is fully inserted in the thread. Make sure to lock the head using the pan lock knob; the idea is that the pan movement will take place at the pan encoder not the tripod thread. Attach the handle bars by inserting them in the clamp grips on the sides of the TrackPod head plate. The grips for the handle bars are saw-toothed so that you may choose an appropriate angle between the TrackPod attachment plate and the handles. Since TrackPods are located above the stage, the operator will be pointing it down most of the time and therefore a sharp angle of 90-120 degrees is preferred. Lock the handles in place, making sure that the handles protrude from the head at an angle of about 30 degrees between them, as shown in Figure 2.

Place the controller on the handle bars so that the two handle bars are *outside* the thumb screws, i.e. the handle bars should NOT go between the screws and the controller box. You will have to find the right height at which this is possible and perhaps even adjust the angle at which the handles diverge. Secure the controller in place by using the thumb screw, the bracket holder and the butterfly nut. Extend the handle bars to a comfortable length and lock them in place.

Mount and lock the counterweights underneath the front end of the attachment plate, beside the laser. Slide the weights along the bars until the TrackPod is balanced. Ensure that the weights are firmly attached and that a safety lock is placed at the end of the rods.
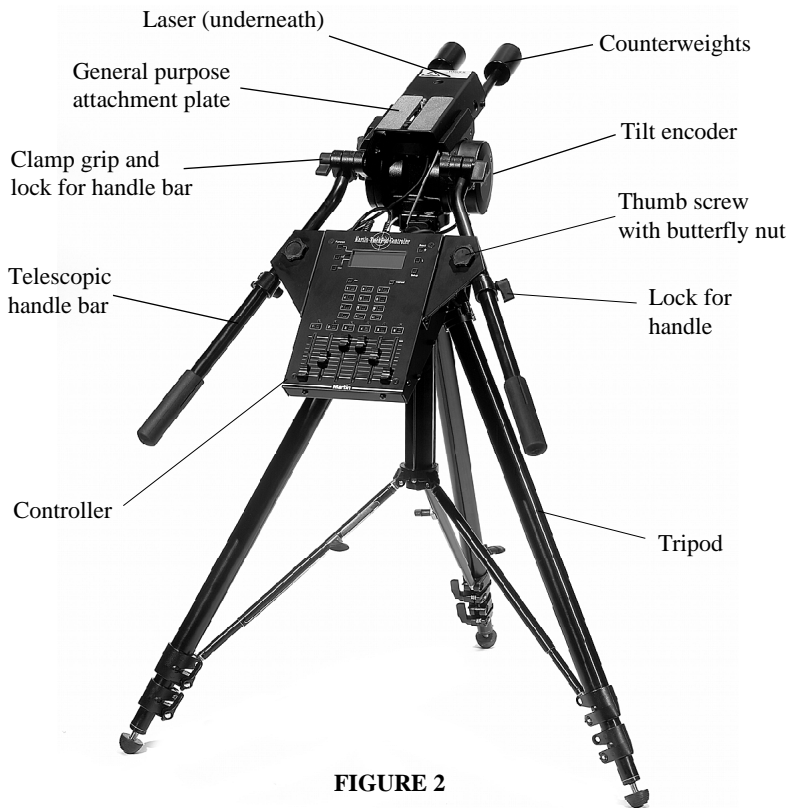
Laser (underneath)

Counterweights

General purpose
attachment plate

Tilt encoder

Clamp grip and
lock for handle bar

Thumb screw
with butterfly nut

Telescopic
handle bar

Lock for
handle

Controller

Tripod

FIGURE 2

TrackPod connections

The back of the controller box has several connectors. The laser and the
pan and tilt encoders come with attached cables which must be plugged
into the appropriate connectors. The male XLR "IN" connector is used
to hook the TrackPod up to the TrackPod card in the PC. This is done
with the supplied serial cable (which is the same as DMX cables, using
pins 1 and 2). The female XLR "OUT" connector is used to connect up
to six additional TrackPods in series.

TrackPod placement

The TrackPod may be placed anywhere around the venue, preferably
close to the stage and high up. It should be **elevated** between 25 and 75
degrees from the stage floor and have a good visibility of the area to be
tracked. The key issue is to maximize the amount of pan and tilt move-

ment that needs to be done to cover the area to be tracked. Truss spot locations are preferable to long-throw FOH locations. At the same time, the operator must be able to have **perspective**: a location exactly over the stage would not be suitable because the operator would not be able to gage the height at which the followspots should be directed. Likewise, a location at the same height as the stage would not be suitable because the operator would not be able to gage the depth of the stage.

There is quite a bit more flexibility in positioning TrackPods than, for example, conventional followspots. It is perfectly possible to have the TrackPod operator be on a side truss and have most automated followspots shining from the proscenium. It is likewise possible (and desirable!) to have a TrackPod aim frontally but controlling several side and back followspots on the performer. In short, the TrackPod does not need to be placed colinear with the fixtures that it is controlling. This means that if you have several TrackPods in a show they can all be
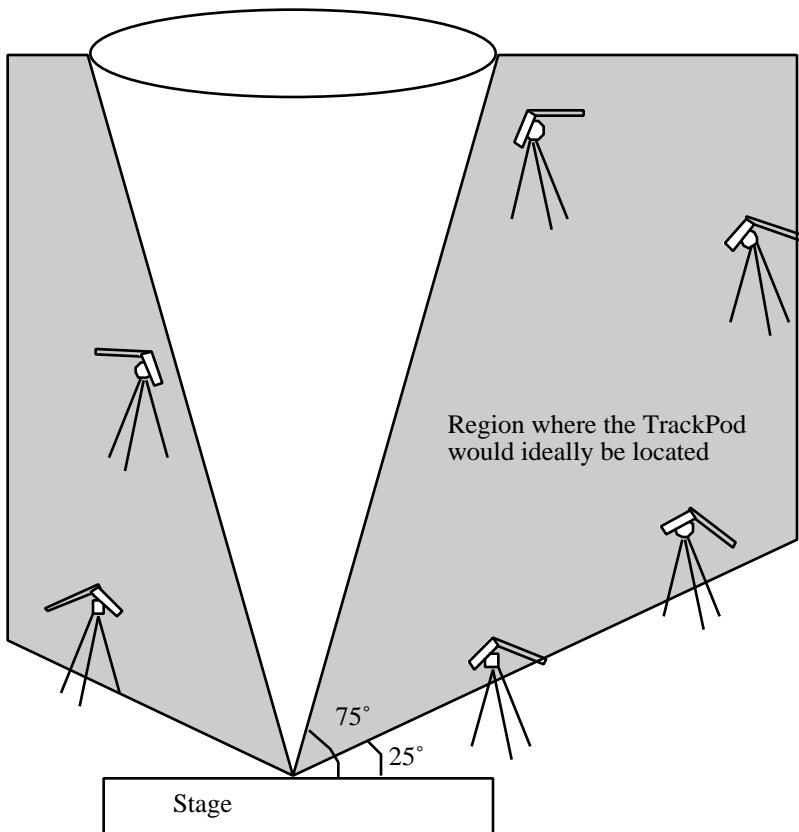

FIGURE 3 - Location of the TrackPod in the venue

placed close to each other in some ideal convenient location, even if they are each controlling fixtures that aim from different sides.

The distance and angle to the stage depends on the venue. For instance, to track players at a stadium the TrackPod should not be located on the playing field but rather on a central, very elevated bleacher (or VIP box!). On the other hand, if you are tracking a small stage you may place the TrackPod on a short platform or riser on the stage. One important rule: always place the TrackPod higher than your performers.

The TrackPod connects to the PC ISA card via standard 3-pin cable used for DMX. The PC is usually placed right next to the main lighting board so it is easy to see and override what the TrackPods are doing. The distance between TrackPods and the PC should not exceed 1 Km.

Tip: it is possible to place a TrackPod head on a threaded mount on a truss. This is useful when there is little space for the tripod. It is worth noting also that the head's panning plane does not need to be horizontal nor the tilt plane vertical. The automatic calibration of the TrackPod corrects for such situations.

TrackPod controller

Figure 4 shows the features of the TrackPod controller. The controller allows an operator to perform a very wide variety of functions. Its faders can be programmed to control any DMX channel for individual or groups of fixtures, thus allowing manual selection of traditional follow-spot parameters (e.g. dimmer, iris, or colour) or of new intelligent lighting parameters (e.g. prism, rotating gobos or automated framing). The controller allows the operator to load and browse fixtures and maps, to bump pages of fader assignments, to see detailed tracking data, to temporarily blind the pan and tilt functionality and more. The controller is also used to calibrate the TrackPod and may be used to calibrate the fixtures. Of course, all or some of the features may be disabled so that the central lighting board retains full control and override capability.

The setup button in the TrackPod controller is available at all times (even when the TrackPod software is not running on the PC). The setup allows you to change the brightness and contrast of the controller display, to test the faders and buttons and to directly read the pan and tilt encoder values to make sure they are working properly. You may lock the TrackPod head in which case all the functions will be blocked until you enter the security code, which is the number **1209**.
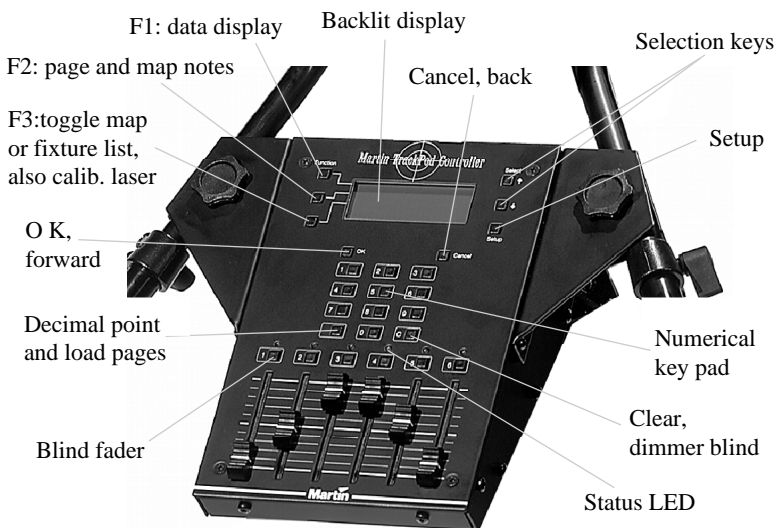
Labels on the figure:
- F1: data display
- Backlit display
- Selection keys
- F2: page and map notes
- Cancel, back
- Setup
- F3:toggle map or fixture list, also calib. laser
- O K, forward
- Decimal point and load pages
- Numerical key pad
- Clear, dimmer blind
- Blind fader
- Status LED

FIGURE 4 - The TrackPod controller

Before you begin

The TrackPod can be powered by either 115 or 230V. Please ensure that the switch on the back of the controller is set to the appropriate voltage before connecting it to the mains. Also, make sure that the power is properly grounded. When you power the TrackPod a welcome message appears on the display followed by a screen that reports the "TrackPod number". The TrackPod number is a unique address that each TrackPod must have in order to be recognized properly by the computer. Since a single PC can be hooked up to seven TrackPods in series you can choose a number from 1 to 7. To do this, press the setup key and choose the second option: "TrackPod#". Ensure that each TrackPod that is connected to the same card has a unique number.

Every TrackPod has a unique "Head ID number" that is clearly printed on a label on the pan encoder of the head. The Head ID number looks something like 036L05081 and contains essential factory settings specific to the hardware. Write down the Head ID numbers of all your TrackPods somewhere safe, like this manual, because the software will ask you to enter them every time you change the computer that runs the system or when you delete all your configuration files.

Tip: when you first run the software the system allows you to choose a venue and fixtures, you can later easily change these selections.

TrackPod calibration

The software must know the precise 3D location and orientation of each TrackPod with respect to the centre of the stage: this is called "calibrating the TrackPod". There are two ways of performing the calibration: automatic and manual.

Automatic calibration

Automatic calibration is the most common method for setting up the tracking system. This method entails measuring the distances between five gaffer-tape marks on the stage floor and then pointing the TrackPod at them to correlate those distances to actual TrackPod readings.

Figure 5 shows the location of the five stagemarks. Mark the centre of your stage with some gaffer tape. This will be the *origin,* the central reference point for the system. Make four other marks: the centre-edge of your stage downstage (close to the public), the centre-edge of your stage upstage (far from the public) and the centre-edge of the stage's right and left wings, as you stand on the stage facing the public.

Tip: even if your public surrounds the stage or if you do not have a specific place for the public, you must choose some points that will define your interactive area and its orientation. These points will serve as a reference when you are using the TrackPod software to define regions of your stage. For convenience, if there is no clear stage orientation, set the "downstage" of the stage to be the side that is closest to the TrackPod computer so that the orientation of the space matches the orientation presented in the software's map editor.

Make sure that:
1. The marks are as far apart from each other as possible in the stage.
2. That marks 2 and 4 form a straight line with the centre mark, —this will be the orientation of the stage on the TrackPod software. Conversely marks 1 and 3 do not need to be in a straight line.
3. That all marks are within range of the TrackPod laser.
4. That all marks are at the same height (you may also have the marks on an inclined plane, but then the plane becomes your stage floor and your height references will be perpendicular to that plane).
5. That the marks are not moved during calibration and the TrackPod tripod is not moved during and after calibration.
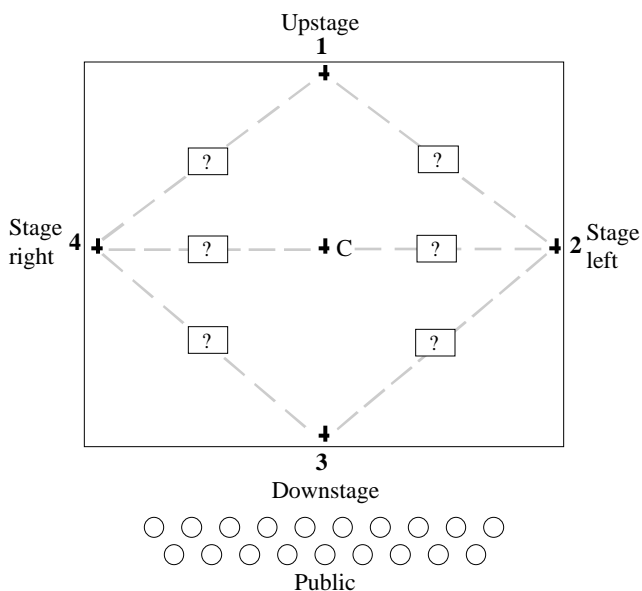
FIGURE 5 - Stage terminology and location of stagemarks.
Note that stagemarks 2-C-4 must be on a straight line.

Measure the distances between the stagemarks as shown in Figure 5, six in total. The measurements have to be in centimetres if metric units are chosen in the preferences and in feet and inches if Imperial units are chosen. Place laser reflectors exactly over the stagemarks: this is not essential but it will help you see the laser. The supplied laser reflectors are "pie slices" designed to be assembled as cones which provide an almost perpendicular surface to shine on. Use the sticky tape on the back of the slices to fold them into a cone. The next procedure will require the use of the laser calibrator. Make sure to read the "warnings" section of this manual (pages 4-5) before attempting this step.

The first screen that appears on the TrackPod display when it is connected to a PC that runs the software, shows the TrackPod number and options for playback or calibration. From this screen, do the following:

• Press number 2 to select the option "Calibration".
• Press 1 "TrackPod" to select a TrackPod Calibration.
• Enter the Head ID Number (printed on the TPod's head) and press OK.
• In the next screens, enter the distance between the different
  stagemarks, in metres or feet / inches depending on which units are
  selected in the preferences. Press the OK button to go forward and the
  cancel button to go back.
• Enter a height for the stagemarks, if any, and press OK.

- To point at calibration point number 1, press and hold the F3 "Laser" key to start the laser. When the laser hits the stagemark, release the F3 key: this will turn off the laser, record the stagemark position and advance to the next screen.
- Repeat the above procedure to point at calibration points 2, 3, 4 and C. If you make a mistake you can always press the "cancel" button to go back one screen and repeat the step.
- After recording the last calibration point a screen will tell you if the calibration was successful and show the 3D coordinates and orientation of the TrackPod. Press OK.
- The system will ask you to point the laser at the downstage corners of the stage. This is to match the virtual world with the real world in case the stage marks are slightly offset from the stage centre or rotated. If the laser cannot reach the downstage corners you may simply point it more or less in the appropriate direction and later you can correct the offset values in the stagemark inspector in the PC software.
- Press any key to go back to the start-up screen... you are done!

Tip: all TrackPods connected to a PC should be calibrated using the same stagemarks. To facilitate this, you only need to enter the distances between the stagemarks once and simply choose the "use existing" option to recall them in subsequent calibrations.

Manual calibration

Manual calibration should be used only if for some reason automatic calibration is not possible, for instance, if you can't use the laser due to stage obstructions. To use this method you must measure the exact position in metres (or ft-inches) of each TrackPod relative to the origin.
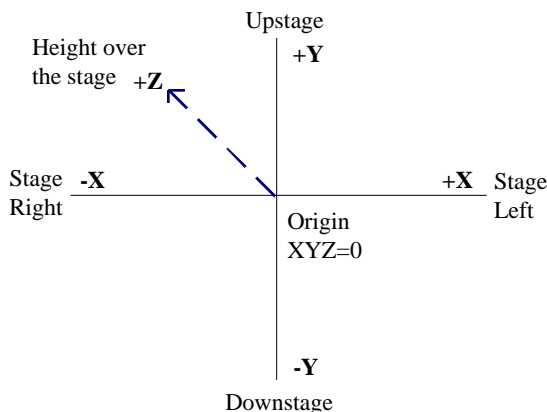

FIGURE 6 - Convention for measuring X, Y and Z

Measure the XY and Z distance from the centre of the TrackPod head to the central stagemark following the convention shown in Figure 6:

• At the central stagemark the X, Y and Z are zero.
• X is the stage width, with positive values towards stage left and negative values towards stage right.
• Y is the stage depth, with positive values towards upstage and negative values towards downstage.
• Z is the stage height, with positive values above the stage floor.

Once you have measured the location of the TrackPod you must enter its orientation. Figure 7 shows the conventions for TrackPod orientation. Positions shown correspond to a zero value and the arrows indicate the direction of positive movement:
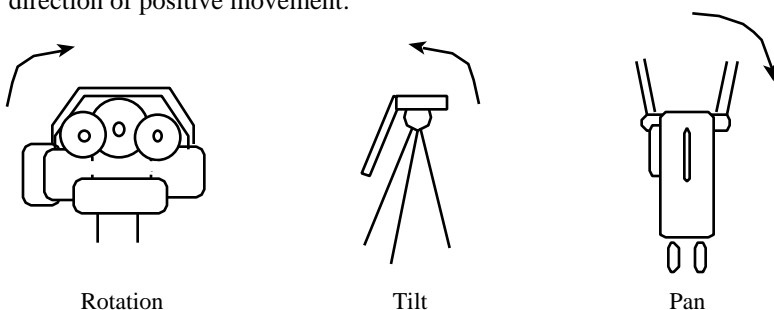

Rotation   Tilt   Pan

FIGURE 7 - Conventions for measuring the TrackPod orientation

To enter manual calibration data, you select the TrackPod in the 3D window and press the "location" button in the TrackPod inspector.

After TrackPod calibration

Once TrackPods have been calibrated they appear in the correct location in the 3D window of the PC software. You will also see the stagemarks showing the distances that you entered. It is very important that the TrackPods not be moved from their exact 3D position or orientation once they are calibrated. If they are moved, even slightly, it will be necessary to recalibrate them (but you can use the same stage marks and measurements if they have not changed since the last calibration).

Tip: once the TrackPods are calibrated you can prevent the TrackPod operators to access the calibration menu, by setting the operator's "access priviledges" in the preferences>trackpods section.

How to connect the TrackPod to DMX consoles and fixtures

The TrackPod can work as a stand-alone control system or in tandem with DMX consoles, software controllers, and so on. The TrackPod card features two 5-pin DMX connectors, one for IN and one for OUT. Normally the TrackPod card is between the main lighting console and the fixtures.
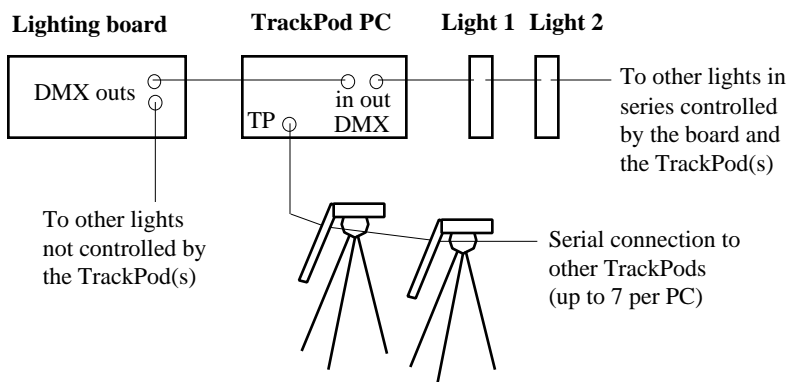

FIGURE 8 - Typical set-up

This is the most common configuration for the system: the TrackPod intercepts DMX data coming from a console and replaces predetermined DMX channels with data generated by the TrackPod. For example, the TrackPod may take control of pan and tilt channels while letting all the other channels be controlled by the console. In addition, through DMX, the console may load and unload fixtures and maps to change the behaviour of the tracking system, or to override it. This is ideal for performance situations in which the lighting designer wants to integrate the TrackPod system into a sophisticated light show, with the DMX console directing all show control.

Once your lights have been securely fixed in their final positions, your DMX chain has been set up, and the fixtures have all been addressed and powered-up, you are ready to define and calibrate all your lights.

Tip: if you want your lighting board to control fixtures by sending them DMX through the TrackPod, you will need to define those fixtures in your console in the same way that if you did not have the TrackPod in between.

Basic light definition

The TrackPod supports up to 1000 DMX fixtures or devices, using up to 3584 DMX channels (with three optional DMX cards, 512 is the standard). The system needs to know specific information about the lights that you will be controlling. To enter this information choose "Fixtures" from the "Set-up" menu.

Press the "Add" button to add any number of fixtures from the library. You may select a light model, an addressing mode, a base channel, and a link. If you add several fixtures the system automatically suggests their DMX channel address if you selected "auto address". The fixtures can be seen in the spreadsheet, where you can sort them by clicking on the different column headings.

Groups

The system has permanent groups for all "Calibrated followspots" (i.e. fixtures with controllable pan and tilt that have been calibrated) and for "All fixtures" which includes all defined fixtures and DMX devices regardless of whether they are calibrated. The system also automatically creates groups of fixtures with the same model, if there is more than one present.

Apart from these automatic groups you may also specify up to 100 "user defined groups". In the spreadsheet, select the fixtures that you want to group —you may shift-click to make contiguous selections or ctrl-click to make non-contiguous selections—and click the "New group" button. This creates a new group which can be renamed by clicking on its name. You may add more fixtures to this group by dragging and dropping the fixtures from the spreadsheet to the group. You may remove a fixture from a group by unchecking the group's name from the fixture's "Groups" column in the spreadsheet.

Fixture IDs

During set-up the system assigns a unique numeric ID to each fixture or group. This ID is the number used by the console or TrackPod operator to call up the specific fixture or group. For example, if the group "All Mac 500s" has an ID=8 the TrackPod operator may load all Mac 500s by simply typing the number 8 in the keypad and pressing OK. The ID

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also determines the order in which fixtures will show up whenever the system presents a list of fixtures to choose from. Three IDs are always the same: ID=0 is "unload all", ID=1 is "all calibrated followspots" and ID=2 is "all fixtures". The rest of the ID s are assigned sequentially as you add fixtures or groups.

Once you are finished defining all the fixtures and groups it is a good idea to press the "Auto #IDs" button. This allows the system to logically organize the IDs by giving lower IDs to groups, then to followspots and finally to fixtures without pan and tilt.

Followspot calibration

The TrackPod needs to know the exact position and orientation of any fixture that you want to convert into a followspot. You may enter this information manually, but this can be a tedious procedure, particularly if your fixture is difficult to reach or if you have several fixtures to measure. Consequently, an automatic calibration routine has been implemented for your convenience.

The automatic calibration method involves pointing the lights to five marks on the stage floor, called followspot calibration points. The procedure can be performed directly from the TrackPod controller or from the PC software. One advantage of calibrating fixtures from the TrackPod controller is that usually it is located close to the stage so it is easier to see if the beams are directed at the stagemarks. On the other hand, if you would like to calibrate many fixtures at once doing it from the PC might be preferable. Here is how to do it with both methods:

Calibrating followspots from the TrackPod

Starting on the first screen that appears on the TrackPod display, do the following:

• Press number 2 to select the option "Calibration".

• Press 2 "Fixture" to select a fixture Calibration.

• In this next screen you have to decide which points of the stage to use for the automatic calibration. You can either reuse the same stagemarks that you already measured when you calibrated the TrackPod (see Figure 5) or you can define new ones.
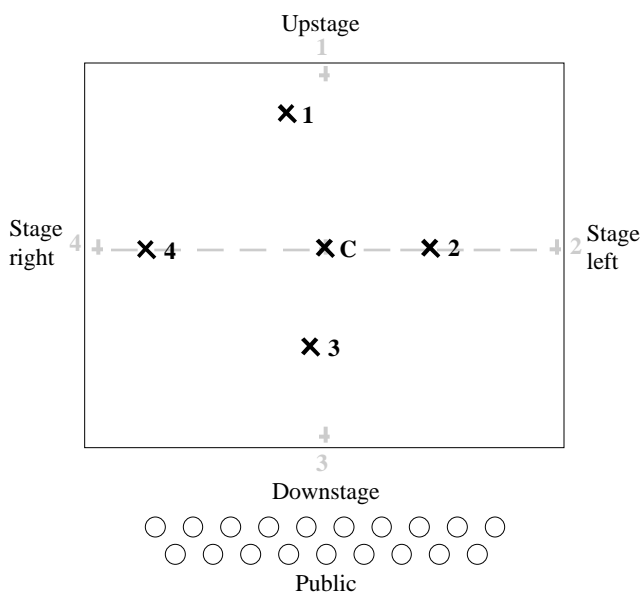
**FIGURE 9 - An example of alternative positions
for followspot calibration points.**

Normally option 1 "Use TP stagemarks" is the most convenient and accurate. The only reason to define new followspot calibration points is if the lightbeam of a fixture cannot reach all five stagemarks because of stage props or pan/tilt limits. If this is the case then choose option 2 "Measure new ones" to enter the distances of new points. The new calibration points should have a similar numbering than that used for the TrackPod calibration (see Figure 9). Followspot calibration points 2, C and 4 have to be in the same line as the stagemarks 2, C and 4 and the origin should be the same for both sets of points. Points 1 and 3 can be placed more liberally around the stage, provided they are not too close to other followspot calibration points.

Option 3 "Point to new ones" is similar to option 2 except instead of entering the distances between the new marks you use the TrackPod laser to "detect" and measure them. This option should only be used if you are in a big hurry since it is not as accurate as real tape measurements.

• Once you have chosen your followspot calibration points you can select which fixture to calibrate. Press the up or down arrow selection keys to the right of the TrackPod controller's display. This will let you

scroll through all the fixtures that have been defined. Press OK to calibrate the fixture that is currently selected.

• Point the beam to each of the 5 calibration points by using faders 1 and 2 for pan and faders 3 and 4 for tilt. Fader 5 will focus the fixture. Press OK when the beam is exactly over the desired calibration point or press cancel to go back to a previous screen..

• Once the beam is pointed at the five stage marks the system finds the 3D position and orientation of the fixture. The next screen that appears allows you to verify the calibration: if you press a number from 1 to 5 the beam will be directed at the corresponding stagemark using the 3D information. If the calibration failed make sure that you pointed the light to the correct calibration point numbers. If the problem persists, repeat the calibration for that fixture only using five different calibration points; even a small displacement of one or two of the points may suffice.

• You are done! Now you may calibrate another fixture following the same procedure.

Calibrating followspots from the PC

In the 3D window right-click on any fixture and from the pop-up menu that appears select "all fixtures". On the inspector window (the small floating window on the top right) click on the "Calibrate" button. The fixture calibration wizard will appear.

STEP 1 - Again, you have two options to define the five followspot calibration points:

i) Use the five stagemarks previously measured for an automatic TrackPod calibration in the stage set-up (see Figure 5). This is the fastest and most accurate option.

ii) Define new followspot calibration points. This option should only be used if a) you cannot perform an automatic TrackPod calibration and therefore there are no stagemarks, or b) the lightbeam of a fixture cannot reach all five stagemarks because of stage props or pan/tilt limits.

To define new followspot calibration points you must mark the stage floor with a similar numbering than that used for the TrackPod calibration. Followspot calibration points 2, C and 4 should be in a straight line

but points 1 and 3 can be placed more liberally around the stage, provided they are not too close to other followspot calibration points. Press the "Define fixture calibration stagemarks" button and enter the distances between the points.

STEP 2 - Point each fixture to each calibration point. Again, you have two options:

i) Use the TrackPod software controls. By pressing on these buttons the TrackPod's graphical pan/tilt controller will let you point the light to the corresponding calibration point.

ii) Use your DMX board and capture its data. If you have a DMX console connected to the TrackPod you may find it easier to point the light at the calibration points by using the console's trackball, touchpad, tablet, joystick or sliders rather than using the TrackPod software. Once pointed, simply capture the appropriate pan and tilt data by pressing the capture buttons.

Tip: you may record preset focus cues for all your fixtures pointing at the five calibration points. You may then select all the fixtures and the software will allow you to "capture" all data simultaneously and calculate all fixtures in one single operation.

Please note that it is very important that the light beam be positioned exactly over the calibration point. This is particularly difficult for wash fixtures as their beam is very wide and diffuse. The centre of the beam must coincide exactly with the followspot calibration points.

STEP 3 - Press the "Calculate" button to let the TrackPod calculate the three-dimensional position and orientation of the light.

Tip: occasionally the five followspot calibration points chosen have a geometric relationship to the fixture that produces two solutions and the software may choose the wrong one. If this happens for a specific fixture, you can tell immediately because the light will not match the points when you press the "verify" buttons. If this happens, make sure that you pointed the light to the correct calibration point numbers. If the problem persists, repeat the calibration for that fixture only using five different calibration points; even a small displacement of one or two of the points may suffice.

You are done! Once fixtures are found they will show up in the correct location in the 3D world.

Manual calibration

If for some reason automatic calibration of followspot fixtures is not possible, you may directly enter the data for each fixture by physically measuring its position and orientation in relation to the centre of your stage. This information can be entered directly in the inspector of each fixture or in the appropriate spreadsheet cells in the fixture set-up screen.

Tip: the only times that you might use the manual method are: a) if you already know the position and orientation of the fixture (e.g. reading it from a previous configuration file), b) if you can't power up your fixtures but still need to set-up, and c) if you must calibrate in bright sunlight and you cannot see the light beam.

Start using the system!

Once TrackPod and fixture calibrations have been completed you can start using the system right away. Press 1 in the TrackPod controller to start playback. Now press 1 and OK to load all the calibrated followspots. Finally, move the first fader to bring up the dimmer. To load different fixtures press the up and down arrow to browse through the fixture list and press OK to load a selected group or fixture. To unload all fixtures press 0 and then OK.

Of course, at this point you may want to load and unload fixtures directly from the console, in which case you have to connect your console to the TrackPod card's DMX IN and set your console to use DMX channels 498 to 512 to control the TrackPod system (for more information see the section on the console driver).

Followspot set-up recommendations

• Choose the right fixture for the job. A PAL FX fixture is better than the profiling one because it has an adjustable iris. Moving mirror lights are faster than moving yoke lights but the latter are smoother.

• Place the fixture keeping in mind that the smoothest response will be obtained when only pan or tilt is moving and not both. So, for example,

if you have a shallow stage where the performer moves from left to right mostly, then set the fixture in a central, frontal location with an orientation such that only pan or tilt will swing for such movement.

• Moving head fixtures hung directly over the stage will "flip" 360 degrees as they track a performer and reach their pan limit (unless the fixture is capable of continuous rotation). Solve this by making it impossible for the performer to "walk around" the fixture and make it reach its pan limit: a) hang the fixtures with their base vertical rather than horizontal or b) hang the heads outside the interactive area.

• Use 16-bit mode. For Martin lights this means using mode 4.

• Set fixture specific parameters for tweaking performance. For instance, control P/T Speed (or M Speed) to make movement smoother or faster. For Martin fixtures, ensure that the pan and tilt offsets in the **adj**ustment > **cal**ibration internal menu are set to 127.

• Control iris, zoom and focus automatically so that the followspot has the same appearance everywhere on the stage. These automated features are only available for popular fixtures but they are very worthwhile.

• For very large stages you may want to automatically cross fade (with cross-fade lines) so that "closer" followspots "take over" when the performer approaches.

• You may want followspots to automatically dim whenever they are directed at a certain region of the stage. For example, you may want them to dim 50 per cent whenever they are pointed at a video screen.

• Use MANY followspots for cool effects. Granted, automated followspots do not have the power, stability, linearity and throw that normal followspots have. However, with the TrackPod system you can have up to hundreds of followspots simultaneously on the same performer (this would get a little pricey the old way!).

• Automated followspots are used frequently for back or key lighting in tandem with conventional followspots.

A tour of the TrackPod software

The TrackPod software runs on Windows operating systems. When you first run the program you specify whether you want a simple or an advanced interface. You may change this option at any time by selecting the "Interface" item in the set-up menu. In this manual we will only deal with the advanced interface. Figure 10 shows the general features of the program. The software has a 3D window used for visualizing and floating windows to view and edit data. What follows is a description of each window.

3D Window

The 3D window shows one to four "panes" with different viewpoints onto the venue. A venue may be as large as 150 x 150 metres (492 x 492 feet). In Figure 10 we see three panes for a top, perspective and front view, but you can choose any arrangement that you prefer. The 3D window has the following 3D tools, from left to right:

Selection tool - This allows you to select items in the 3D world. You may shift click to make multiple selections or drag with the mouse to
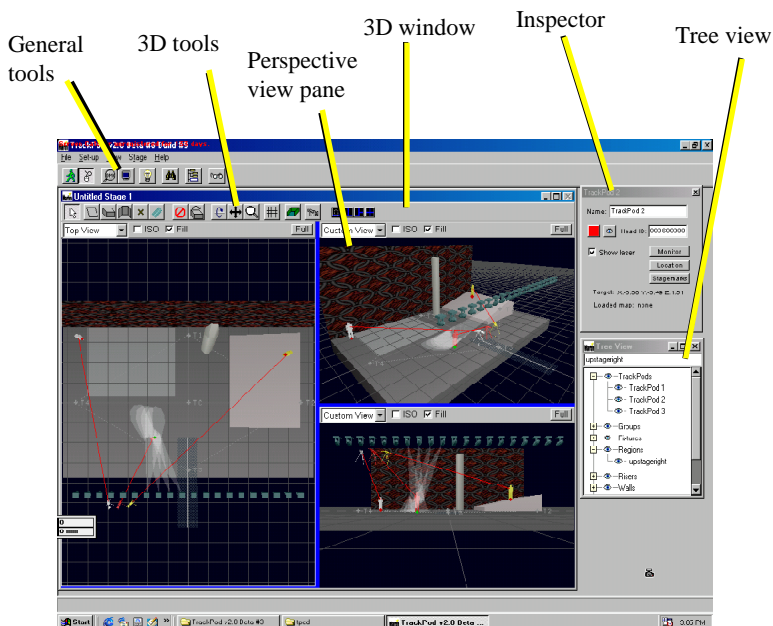

FIGURE 10 - Main features of the TrackPod software

make a "bounding rectangle" which selects any items within it. Clicking outside of an item will deselect it. With the selection tool you may move an item by clicking and dragging or you may click and drag on a control handle to resize the item.

Region tool- Draws a region or zone on the stage floor (click and drag the mouse). This is useful to specify different areas of the stage where you might want something to happen. For instance, you may want some followspots to only be operative when the performer is within a certain region.

Riser tool - Creates risers or ramps on the stage floor (click twice to specify the width and length, move the cursor up or down and click again to set the height). Risers allow the software to automatically compensate for different stage heights so that it may point the followspots at the right height when the performer is over them.

Wall tool - Creates a wall (multiple clicks to set start and end points and right click to set a height). When a TrackPod points at a wall it will automatically direct the followspots to go up the wall.

Focus point - Creates a single point on the stage which may be used to quickly direct followspots at it.

Cross-fade line tool - Creates a line and area over which followspots will automatically cross-fade (click twice to specify the line length, move the cursor up or down and click again to set the width. This is useful in large stages, for instance, so that followspots that are closer to a performer automatically take over when he or she is close by. For example, imagine you had calibrated 30 Mac2000s and that you draw a cross-fade line on the top view so that 20 of them are on the right and 10 on the left of the line. When the performer is on the right of the stage the 20 followspots will illuminte him but as he crosses to the left side of the stage automatically the other 10 followspots will cross-fade and pick him up. The width of the line determines how quickly the followspots will cross-fade.

Erase tool - Click on any item to erase it. *Tip: to erase you may also select the item and press the "delete" key in the keyboard.*

Riser rotate - Rotates risers along any pivoting point (click once to choose a pivoting point and click again to accept a rotation). *Tip: you may rotate risers also by selecting an angle in the Riser inspector.*

Examine, Move and Zoom tools - Use to change the camera view.

Grid inspector - This button opens the grid inspector which lets you specify grid colour, visibility, snap to grid behaviour, visibility of stage labels and spacing.

Venue inspector - Opens the venue inspector for setting its colour, textures, visibility and to launch the venue set-up screen.

Camera inspector - Opens the camera inspector for setting camera position, rotation and field of view. *Tip: this will apply to whatever view panel is highlighted, to highlight a panel click on it once.*

View pane buttons - These four buttons are preset view panel arrangements with one to four different views. *Tip: you may also resize panes by dragging the bright blue line that separates different panes.*

Each view pane in the 3D window also has a drop-down menu to select a view, an ISO checkbox to see the venue in Isometric view (helpful for precise editing), a "Fill" checkbox to show wireframe or shaded views and a "Full" button which will enlarge the pane to take over the entire 3D window.

Inspectors

Selecting an item on the 3D window displays the appropriate "Inspector" window for that item. The Inspector itself is a floating window that allows you to edit and view properties, —the changes apply automatically, therefore it is not necessary to close the window for them to take effect. Most inspectors are self-explanatory but here is a discussion on some important inspectors:

TrackPod inspector - View and edit the name of the TrackPod, its colour, visibility and Head ID number (which can also be entered during TrackPod calibration). Shows the XYZ coordinates of the TrackPod target and the name of the loaded map, if any. Three buttons open up different windows:

> The **monitor** button evokes a window that simulates the Track-Pod's controller. With this monitor you can view what the operator is doing in real-time. You may also click on the "Override" checkbox so that the monitor can simulate all the functionality of the controller. For example, you may test fader patches,

fixture loading, and so on, without actually having the hardware.

The **location** button opens a window where the position and orientation of the TrackPod can be viewed or entered. *Tip: normally, the TrackPod's location is determined by an automatic calibration.*

The **stagemarks** button opens the stagemark inspector for calibration, see below.

Fixture inspector - View and set the name of a fixture, its visibility, colour, patch info, position and rotation (which are normally determined by an automatic calibration). Some functions merit specific description:

The **control** button opens the **fixture control screen**. This screen has all the controls available for the selected fixture(s). Every parameter can be controlled manually or "locked" so that only the DMX console can control it. *Tip: the fixture control screen is useful during playback to set or view the parameters of any light. The screen can also be opened by clicking on the fixture control button on the main program window.*

The **calibrate** button opens the fixture calibration wizard, which walks you through the calibration process (see p. 21 for instructions).

The **flip swing point** checkbox toggles by 180 degrees the point at which moving heads' pan motors "swing" when they reach their limit.

The **show beam** checkbox toggles whether the lightbeam for the selected fixture(s) should be visible in the 3D window.

The **show target** checkbox shows or hides a beam target on the stagefloor. The target may be moved to any location on the stage and the beam will follow it. You may shift click or draw a selection rectangle around many fixture targets to move several beams at once. *Tip: when the targets are visible the system takes control of the pan and tilt channels of the fixture(s).*

Calibration stagemarks inspector - this inspector appears when you click on the calibration stagemarks (shown in the 3D window as a dotted line "diamond" with labels T1, T2, T3, T4 and TC) or when you click

the stagemarks button in the TrackPod inspector. Here you can view or enter the distances between the five stagemarks used to calibrate the TrackPod. *Tip: the distances can be entered as well directly in the TrackPod controller when performing a TrackPod calibration.*

Tree view

The tree view window shows all the TrackPods, fixture groups, individual fixtures, regions, risers, walls, focus points and cross-fade lines defined in the current stage configuration. You may select, toggle the visibility and rename any items here. A text entry field at the top of the window searches for an item by name, even if there is only a partial entry, making it a very fast method to select a discrete item. *Tip: every item may have a user-defined name, —custom names help find items quickly.*

Map Browser

To use the TrackPod system you must calibrate the TrackPods and the fixtures. Once this is done most users simply use their normal show console to tell the system which followspots to load and unload (see the console driver section in page 33). Sometimes it is convenient to define a "map" which is basically a collection of actions that can be triggered with a single command. Maps can be thought of as "macros", that is, as collections of instructions that can be conveniently loaded at once. The Map browser has a top section with a spreadsheet showing the available maps and a bottom section showing the actions that make up each map.

Tip for users of previous versions of TrackPod software: maps are no longer necessary to operate the system, now you can call up any followspots from the console or TrackPod controller without needing to preprogram maps.

A single map might have the following actions, for example:
Action 1 tells a group of 22 fixtures to become followspots only while the performer is on a certain region of the stage.
Action 2 tells the same group of fixtures to dim out when the performer is on a riser.
Action 3 tells 250 par cans to light up when the performer is upstage.
Action 4 tells 12 fixtures to become followspots everywhere on the stage and to fade out automatically if the performer exits the stage.

All of these actions will be called simultaneously when the console loads the map. You can define up to 255 maps for each TrackPod and these can be loaded at the same time that individual fixtures or groups are loaded directly.

Tip: actions are reusable. After defining an action it will be available from the pop-up menu next to the "remove" button.

Fader patches

TrackPods have an on-board controller with six faders. You may specify what features of the automated followspots assigned to the TrackPods will be controlled by these faders. There are a total of 10 different "pages" that may be defined so that, for instance, the operator may have control of intensity and colour in the faders of page 1 and gobos and iris on the faders of page 2. The operator can switch pages by pressing the asterisk button followed by the page number on the TrackPod controller. This means that in fact you have 60 faders that can be defined. The default "Standard" fader patch style has three assignments in page 0: fader 1 is a dimmer offset (i.e. this fader will increase or decrease the current intensity of the followspots), fader 2 is sharpness (i.e. this fader will sharpen or unsharpen the followspot beams), and fader 3 is beam size (i.e. this fader will control the beam width of the followspots).

Each TrackPod has an associated fader patch style. This can be set in the Preferences > TrackPod screen. The fader patch will be available universally, that is, if the style says that fader 1 in page 0 is a master intensity then this dimmer will work on ANY fixtures that are loaded on the TrackPod at any given time.

Tip for users of previous versions of TrackPod software: it is no longer necessary to set specific fixture controls, —the system applies your preferences to any and all followspots that you load. If you assign a fader to a channel that exists in some fixtures but not in others the command is simply ignored by those fixtures that do not support it.

If you want the TrackPod operator to have no control of any lighting parameters other than pan and tilt then select the "no fader control" style. If you want to create a new fader patch style press the "new" button, click on each specific fader, and set the parameter that the fader should try to control. Most controls are self-explanatory but here are some additional notes:

The sixth fader, the one furthest to the right, is always used for changing the **target height** of the tracking system and this is why it is not shown on the pages (see next section for an explanation of height control).

The **"Intensity Master"** sets the intensity of the followspots from 0 to 100. The **"Intensity Offset"** offsets the current intensity of the followspots by -100% when the fader is all the way down to +100% when it is all the way up. This is useful when the console, a cross-fade line or a map are controlling the intensity and you want to bump it up or lower it a bit from the current value. The **"Intensity by ID"** option sets the control of the intensity of specific followspots; for instance, you may assign a fader to only fade a group of Mac500s.

If you click on a page you will see automatically generated notes that reveal the fader definitions. These notes can be seen in the TrackPod display during playback (by pressing the F2 key) so that the operator may remember what parameter is controlled by what fader.

Height control

The TrackPod encoders calculate where a performer is in two dimensions (x and y) and the system has several ways of specifying the actual height of the performer (the z) which tends to be quite constant during most performances. Please refer to Figure 11 to understand the concept of target height.

Target height - This is the height above the stage floor at which followspots will be directed, i.e. where they will intersect. By default this is 1.5 metres, which is an average height to light performers' faces. This target height can be changed during playback by moving the sixth fader in the TrackPod controller. If you bring the sixth fader all the way down the target height will be zero and all the followspots will be directed at the stage floor. The only times that you may want to vary the target height is if you are tracking performers of different heights or if all of a sudden your performer lays down on the floor. Target height is very important when fixtures shine onto performers from all different angles because in those situations it can be difficult to track by only using shadows as a guide. If the target height is set for the appropriate height of the performer you are guaranteed that if he or she is in your line of sight ALL followspots will shine directly on him or her.
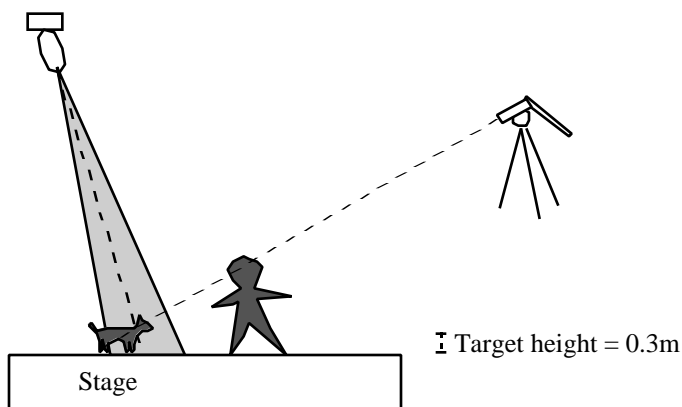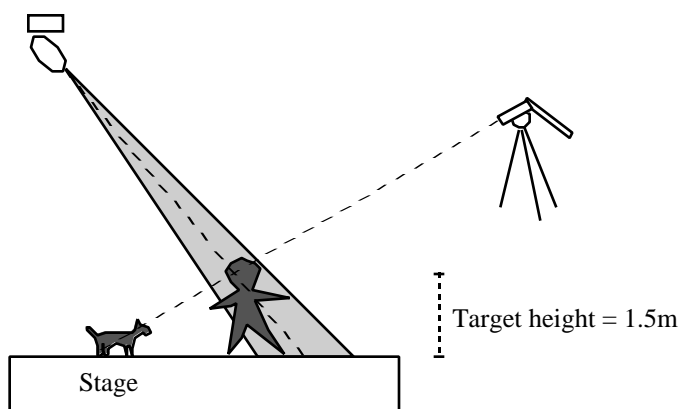
FIGURE 11 - Target height explained. The TrackPod is pointing at both the actor and the dog but the followspot is directed at the actor if the target height is set to 1.5 m and at the dog if the target height is set to 0.3 m.

Risers - If the stage has ramps or platforms you may use the "riser tool" to define their location, inclination, size and height. When the TrackPod is pointed at a defined riser it will automatically add the target height to the height of the ramp or platform so the performers are still properly lit while on the riser.

Megapod - If you have two TrackPods you may combine them to give you a true 3D point by asking both operators to point at the same performer. This is useful in shows with flying performers or where the target height is constantly changing and cannot be approximated with manual control. To enable the megapod, go to the preferences screen

and define the megapod by specifying which two trackpods to use. If there is a lot of disparity between the two operators the system will reset itself to follow the "master" TrackPod. When using the Megapod functionality the risers and target heights and offsets are ignored, since they are not necessary.

Using the console driver

The TrackPod system can be completely controlled by an external DMX console that has a TrackPod driver (also called a "personality" or "profile"). If your console does not already have a TrackPod driver, the console manufacturer or a programmer can add one by using the channel descriptions and examples that can be found in the "driver.txt" file that is installed with the program files.

To use the console driver, connect the console's DMX out to the Track-Pod PC's DMX IN and enable the console's TrackPod personality assigning it to a certain base channel address (the driver uses 15 channels). By default the TrackPod is set to listen to channels 498 to 512 on the link but this can be changed in the preferences. This process is similar to how you would assign an address to a fixture.

In a nutshell, the new driver allows using the TrackPod system without the need to preprogram a show, i.e. it is not necessary to define maps. Basically, the console can select any calibrated fixture or group of fixtures and assign them to any TrackPod on the fly. Of course, you may remove any fixtures at any given time and access automated effects like automatic beam size and focus. Many console operators like to prevent the TrackPod operator from controlling any fixture parameters except pan and tilt (this can be accomplished by setting appropriate access priviledges for the TrackPod in the preferences) and then remotely control the operation of the entire system from their console.

Tip: the PC software has a "Driver Monitor" window which lets you see what commands are being sent by the console in real-time playback.

For a complete explanation of the driver functionality please see "driver.txt" file which the installer places in the same directory as the trackpod.exe application.

Real Time - playback

When the start playback or the mouse test button is pressed real time playback begins. If your video card cannot render the 3D display you might see a warning and the software switches to a 2D view to guarantee enough processor power for crucial DMX tasks (in the preferences you can set when the warning appears).

During playback you might want to open the console driver monitor to see the commands received from the console. Also, the light control screen will let you view what each fixture or group is doing. The DMX monitor shows all the 512 DMX channels IN and OUT, so this is a useful tool for debugging. Click on a TrackPod and from the TrackPod inspector you can launch the TrackPod monitor which shows exactly what the operator is doing.

The TrackPod controller's real time features

The TrackPod controller's on-board display shows important information during real time tracking. The first line shows the map number or fixture ID, followed by the real target height and then the target height fader setting. If the target is on a riser the letter "R" appears. The second line shows the current page number and the fader patch style name. The third line shows the loaded map's name or loaded fixture ID. The F3 key can toggle the fourth line between showing a list of maps or a list of fixtures. You can press the up and down arrows to scroll thorough the fixture or map list and press OK when the name of the map or fixture that would load appears.

The F1 key toggles the display to show the exact XYZ coordinates where the TrackPod is pointing to. Also, the DMX values of the faders are displayed. The F2 key shows the page notes for the current fader page and if pressed again any map notes. For both the fader page and map notes you may scroll up and down using the arrow keys. The F3 toggles between map and fixture lists.

Pressing the up and down selection arrows scrolls through all the available maps or fixtures for the TrackPod. When you want to load a selected map simply press OK to accept the selection. Alternatively, you may enter the map number or fixture ID number directly in the keypad to select it and then press OK to load it. *Tip: you may prevent the operator from loading maps and fixtures by setting the appropriate "access priviledges" in the preferences screen.*

To switch fader pages simply press the asterisk key followed by the number from 0 to 9 that corresponds to the desired page number. The faders will not be asserted until they are moved slightly. To temporarily "blind" the followspots press the "c" clear button in the keypad, as you press it the followspots blackout and you may point at a different place. To blind a fader press the blind button on top of the fader, this will allow the operator to set a fader without asserting it and snap the value by unblinding the fader. In general, if the red LED is not on for a fader then it does not have control of any parameter.

If during a show the TrackPod is moved from its calibrated position you may quickly calibrate it again (if the preferences screen grants calibration priviledges) by pressing the cancel button, which takes you to the main launch pad.

Example

Here are the necessary steps to have a TrackPod control pan and tilt for a number of lights to follow a performer, with a few DMX channels controlled by the faders and the rest by the main lighting board:

1. Install the card in the PC and connect its DMX IN and OUT links to the board and the lights respectively (see pages 7 and 17).
2. Assemble the TrackPod and connect it to the card's TrackPod serial link (see pages 8 to 12)
3. Power and calibrate the TrackPod (pages 13 to 16).
4. Define and calibrate your lights (pages 18 to 21).
5. Press the Start playback button
6. Press 1 in the numeric keypad and OK to load all followspots.
7. Bring up the first fader, corresponding to intensity, to see the beam.

About sighting devices

To calculate 3D position, it is essential that the TrackPod's head plate be aligned with the performer. While it may be easy to follow a performer simply by looking at the followspot beams or the shadows cast, we recommend using a sighting device for precise, reliable work. This way, operators concentrate on following performers by targeting them with the viewing device, which functions as the main tracking reference. There are two common sighting devices used: video cameras and reflex finders.

A video camera with an LCD display is a popular choice because you can see the image from any angle. In addition, you may "zoom in" to follow performers more closely or to see the laser dot more clearly during calibration routines. Another useful feature may be the use of "night shot" or other infrared filters which allow cameras to see in the dark, so the TrackPod operator has a view of the performers even during dark scenes.

Another popular, and much less expensive option is a reflex finder sight used for telescopes such as the "Telrad", "Orion Finder" or the "Spot Dot". These may be purchased in astronomy stores and provide for comfortable viewing of an illuminated target image overlaid onto the performer. Professional followspot operators have been using these sights for quite a while, to improve their precision

Here are some places where reflex finders can be purchased online:
Telrads - http://store.yahoo.com/eagleoptics/telradfinder.html
Telrads - http://www.focuscamera.com/
Orion finders - http://www.telescope.com/
Spot Dot II finders - http://www.toolsforstagecraft.com/n307.htm

It is strongly recommended that users attach a viewing device, particularly if a) the lights are not shining from the same location as the TrackPod, b) the stage area or throw area is large, and c) there is a large number of automated followspots.

For further reference

The TrackPod software has a status bar on the bottom of the screen which gives help and instructions as you roll-over different buttons and commands with your mouse. Also, detailed memos have been placed in most screens to explain their functionality.

Please visit our website at www.martin.dk for free software upgrades, news, and the TrackPod newsgroup. Contact us at mld@martin.dk for bug reports, feature requests, suggestions or questions.

Subscribe to the "APR announcements" mailing list by sending a message to mld@martin.dk with the message "subscribe". This subscription is free and open to anyone who wants to learn the latest tricks, case studies and features of the system. On average there is only one message a month.