Version for reaffirmation public review

E1.44 – 2014 (R2019)

Common Show File Exchange Format for
Entertainment Industry Automation Control Systems - Stage Machinery

Approved by the ANSI Board of Standards Review on _____

SL/2019-10002r0

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Interest category codes:
CP = custom-market producer
DE = designer
DR = dealer rental company
G = general interest
MP = mass-market producer
U = user

Table of Contents

Foreword
This standard was formulated by industry professionals working in facility and systems engineering, design, and consulting.

1 Scope
This standard is intended to address common show file requirements for automated stage machinery control systems used in entertainment venues. It establishes a minimum level of design and performance guidelines for the integrated software design of processor based machinery control equipment. The purpose of this guidance is to ensure that users will be able to transfer, modify and customize a 'least common denominator' show file for the data required to tour entertainment productions from one facility to another, even when the facilities' physical conditions, hoist inventories, and placements, and the machinery control consoles and data topology differ.

Show file control functions addressed by this standard include:

- The relation between scenery and axes
- Grouping of axes
- Show cues and their basic content with:

    Movements of axes or groups to pre-determined positions.

    Movements of axes or groups in a linear or rotational fashion only.
    (with acceleration, constant velocity and deceleration).

At this time the standard does not include the following features, although amendments to include additional feature sets in later revisions of the standard are not precluded:

- Interrelated, dependent or interpolated movements.
- Movement effects.
- Multi-axis 3-dimensional flight-path movements.
- Rules or conditional Boolean logic.

2 Normative References
All show files shall be written in XML format.

This standard acknowledges current XML standards:

Extensible Markup Language (XML) 1.0 (Fifth Edition)
W3C Recommendation 26 November 2008 (www.w3.org/TR/xml)
ISO/IEC 10646, RFC 281, UTF 16, 16 Bit Unicode Transfer Format

3 Definitions

3.1 axis (pl. axes): used within this standard for a single "degree of freedom" (DOF) of a stage automation machine that can be used to move scenery, curtains, or other equipment on stage.

3.2 load carrying device: the component(s) of a hoist system that connect a suspended load to the lifting media (e.g. batten, pipe, truss, hook).

3.3 load attachment device: the component(s) of a machine that connect a load to the machine (e.g. a pin on a deck winch).

3.4 plaster line: an imaginary reference line that indicates where the proscenium arch or an alternate structural element (ie column, girt, wall face) is located. Typically, the plaster line runs across the stage at the back face (upstage face) of the proscenium wall perpendicular to the Center Line.

3.5 show file: the software record of motorized machinery and their movements that is used to generate site specific venue information, patch information and cues in any venue used by an entertainment production.

3.6 source system: the control system that generates the production's show file by converting its internal data structures to the show file format.

3.7 source venue: the venue from which the production and its show file originated

3.8 target system: the control system that reads the production's show file by interpreting the contained data and converting it into its internal data structures.

3.9 target venue: the venue into which the production is moving and for which the show file needs to be modified.

3.10 trim: a position reference for line-set type machinery. This is also known as "dead" or "spike mark".

3.11 UTF-16: 16-Bit **U**nicode **T**ranslation **F**ormat: Is an extension of the Unicode and ASCII (American Standard Code for Information Interchange) code that describes characters used globally. This is described in ISO/IEC 10646, RFC 2781

4 Design Requirements

4.1 General

The show file

- shall only contain valid XML structures
- shall contain all of the required data as defined in this standard.
- may contain optional data as defined in this standard.
- may contain manufacturer specific data that is not defined in this standard.

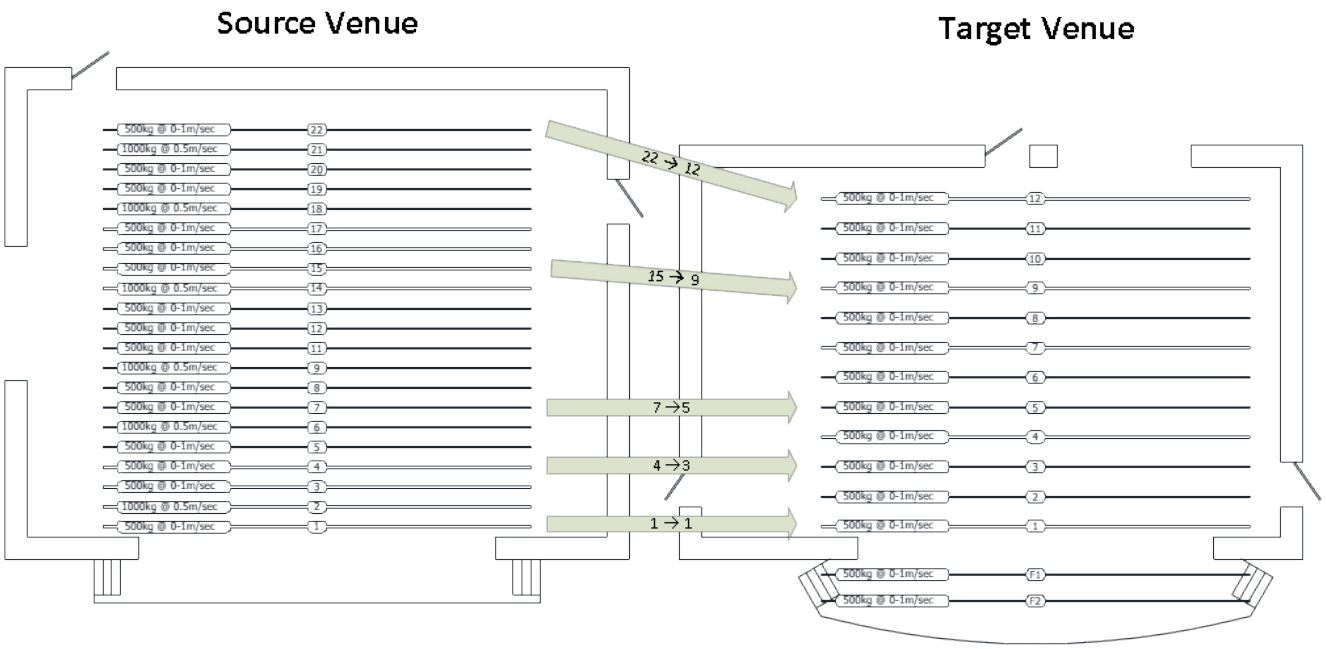
Manufacturer specific data utilized in a show file shall be well documented in the form of XML comments within the show file.

XML tags or entire data tree structures that cannot be interpreted by the target system shall either be ignored or presented to the user as "Interactive Decision Points". The user then has the ability to decide what to do with the information (see 4.3).

4.2 Data Conversion at Show File Import

The show file may contain information of the ***source venue*** in the ***axes*** section of the data structure. This optional information describes the location and capabilities of the machines of the system where the production was originally programmed.

This information is purely informative and can be utilized by the target system software at the point of show file import to help the end user to make educated decisions about which machines to use in the new venue.
For example: The user may choose line-set 9 in the target venue for scenery originally attached to line-set 15 in the source venue simply because of its location, load capability or other factors.



Picture 1: plan view, theatres with different Line-Set configurations

For the show file import process, manual supervision will always be necessary but the more information available in the show file and the target system, the more suggestion can be provided by the target system. The 'intelligent import patch' functionality is not mandated in this standard and is purely up to the manufacturer's software implementation.

It shall always be possible to import a show file without any source venue information. In this instance, the user will have to assign each piece of scenery completely manually to an axis of the target venue at the time of show file import.

Important: the source venue information provided in the axis data section is not intended to provide data structures for 3D theatre visualization or similar applications.

4.3 Interactive Decision Points

Manufacturers have differing levels of cue and movement complexity their software is intended to support. In order to aid the end user with the show-file import process, the source venue show file shall contain Interactive Decision Point Content as described herein to provide more information about the intent of the show.

This content shall be simple human readable text strings which can either be auto-created by the source system if certain data cannot be packed into the file format data structures of this standard, or they can manually be entered by the end user at the point of show file export.

There shall be a log created to describe steps taken to respond to each Interactive Decision Point.

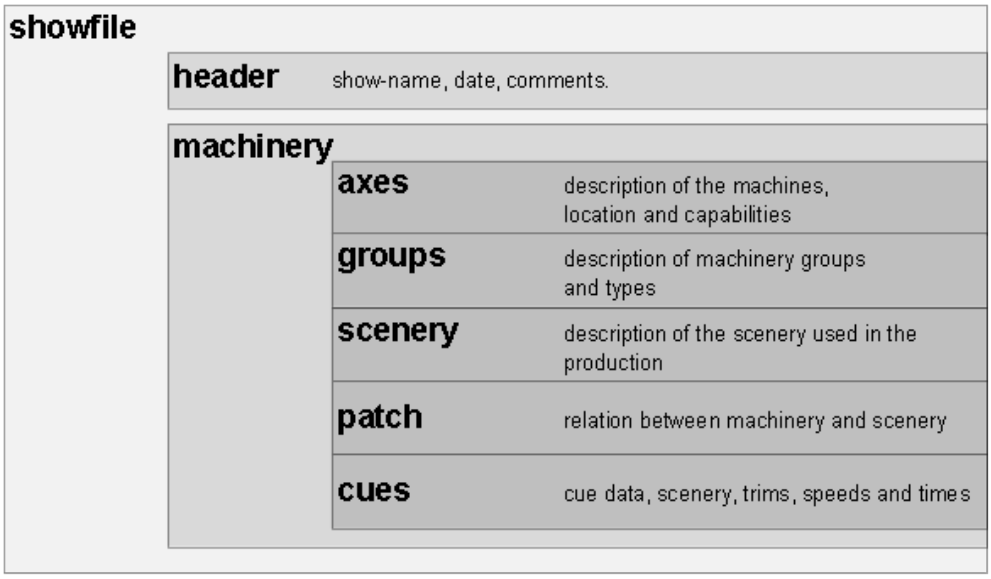
Potential Interactive Decision Points include but are not limited to:

- Translation of Cue Sequence Standards (Auto-follow, delay and follow, Part Cueing, Submaster Activation, etc.) or Multi-Target Cues (Cue Conditional moves, Loops, etc.) by Cue or by Axis.

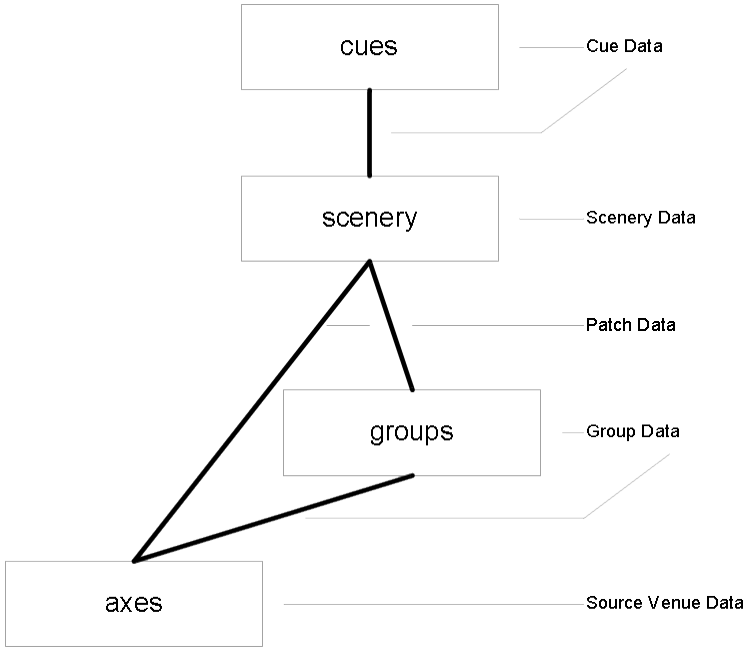
- Information about movement-rules and interlocks

4.4 Show File Structure and Data Relation

The show file shall be organized in several structures. It shall start out with a header containing general data followed by a machinery specific data structure.



Picture 2: show file structure



Picture 3: data relations

5 Show File Description

5.1 Show File Structure

The show file shall contain a header structure and a machinery structure as separate data structures.

```
<?xml version="1.0" encoding="UTF-16">
<DOCTYPE showfile>
<!-- link to DTD on ESTA server -->

<showfile>
       <header>          </header>

       <b_machinery>
              <b_axes>    </b_axes>
              <b_groups>  </b_groups>
              <b_scenery> </b_scenery>
              <b_patch>   </b_patch>
              <b_cues>    </b_cues>
       </b_machinery>

</showfile>
```

XML Example 1: File structure

5.1.1 Data type definitions

Throughout the document, the units of measure shall use millimeters (mm) for length, kilograms (kg) for mass, seconds (s) for time, millimeters per second (mm/s) for speed, millimeters per second² (mm/s²) for acceleration and deceleration and degrees (360° for one full revolution) for angle.

All text strings within the XML structures shall employ UTF-16 Unicode data type.

Numbers without decimal places shall employ the integer data type.
Example: year, reference-id,

Numbers with decimal places shall employ the float data type.
Example: acceleration (mm/s^2), speed (mm/s)

5.2 Header Structure

The optional header shall contain general data related to the show file.

This data shall mainly be used for identification of the file, base line reference information, housekeeping, version control and administration purposes.

The file storage date and name included in this header shall be generated by the source system at the point of file storage and may vary from the actual file name and storage date displayed by other operating systems.

```
<header>

       <show_name>ESTA Machinery Showfile Example</show_name>

       <notes>This is the first ESTA E1.44 draft Idea</notes>

       <user>Joe Operator</user>

       <date>
              <year>2011</year>
              <month>6</month>
              <day>23</day>
              <hour>17</hour>              <!-- 24 hour clock notation-->
              <minute>47</minute>
              <second>24</second>
       </date>

       <versions>                                  <!-- Versions included in this data file -->
              <version>ESTA-E1.44-2013</version>   <!-- Basic E1.44 Standard -->
              <version>ESTA-E1.XX-2019</version>   <!-- Future Extensions    -->
```

```
                                                <!-- Manufacturer specific data -->
            <version>XYZ-SUPERFLY-V2.0-2013</version>
            <version>UPUPANDAWAY-EXPLORER-V1.0-2013</version>
            <version>ABC-MoveIt-V3.0-2013</version>
        </versions>

</header>
```

XML Example 2: Header Section

Structure	Possible Elements / Attributes	required / optional
header	show_name	optional
	notes	optional
	user	optional
	date	optional
	versions	optional

Structure	Possible Elements / Attributes	required / optional
date	year	required
	month	required
	day	required
	hour	required
	minute	required
	second	required

Structure	Possible Elements / Attributes	required / optional
versions	version	required

<header>	Tree	Type
	<showfile>	structure
contains	general file information like name, date and notes.	

<show_name>	Tree	Type
	<showfile><header>	string
contains	the name of the show stored in this file. The show file name shall be a UTF-16 Unicode text string. This name embedded inside the file and may vary from the actual file system file name.	

<notes>	Tree	Type
	<showfile><header>	string
contains	additional user notes.	

<user>	Tree	Type
	<showfile><header>	string
contains	the name of the user who stored this file.	

<date>	Tree	Type
	<showfile><header>	structure
contains	the date and time of show file storage action. this time is embedded inside the file and may vary from the actual file-system file time.	

<year>	Tree	Type
	<showfile><header><date>	unsigned integer 1900 – 9999
contains	the file storage year information.	

<month>	Tree	Type
	<showfile><header><date>	unsigned integer 1 – 12
contains	the file storage month information.	

<day>	Tree	Type
	<showfile><header><date>	unsigned integer 1 – 31
contains	the file storage day information.	

<hour>	Tree	Type
	<showfile><header><date>	unsigned integer 0 – 23
contains	the file storage hour information expressed in 24 hour notation.	

<minute>	Tree	Type
	<showfile><header><date>	unsigned integer 0 – 59
contains	the file storage minute information.	

<second>	Tree	Type
	<showfile><header><date>	unsigned integer 0 – 59
contains	the file storage second information.	

<versions>	Tree	Type
	<showfile><header>	structure
contains	the version information of the data structures used within this file.	

<version>	Tree	Type
	<showfile><header><version>	string
contains	the reference to the version(s) of this standard and also manufacturer specific data structure specification version(s) used within this file BSR-E1.44-2013 the file contains data structures according to this standard.	

5.3 Machinery Structure

The machinery structure shall incorporate all information relevant to the movement of stage machinery for the production stored within this show file. This area is divided into a number of sub-structures that are all contained within the machinery section.

5.3.1 Data definitions

The following chapters define the data used throughout the XML structures of this standard.

5.3.1.1 Location of Machinery

For the description of the location of machinery, a 2D plan view shall be used, employing a Cartesian coordinate system with a datum point of:

x: stage centerline stage left = positive numbers
y: plaster line upstage = positive numbers

All positions shall be noted in SI units in millimeters (mm).

5.3.1.1.1 Location of a Conventional Line-Set

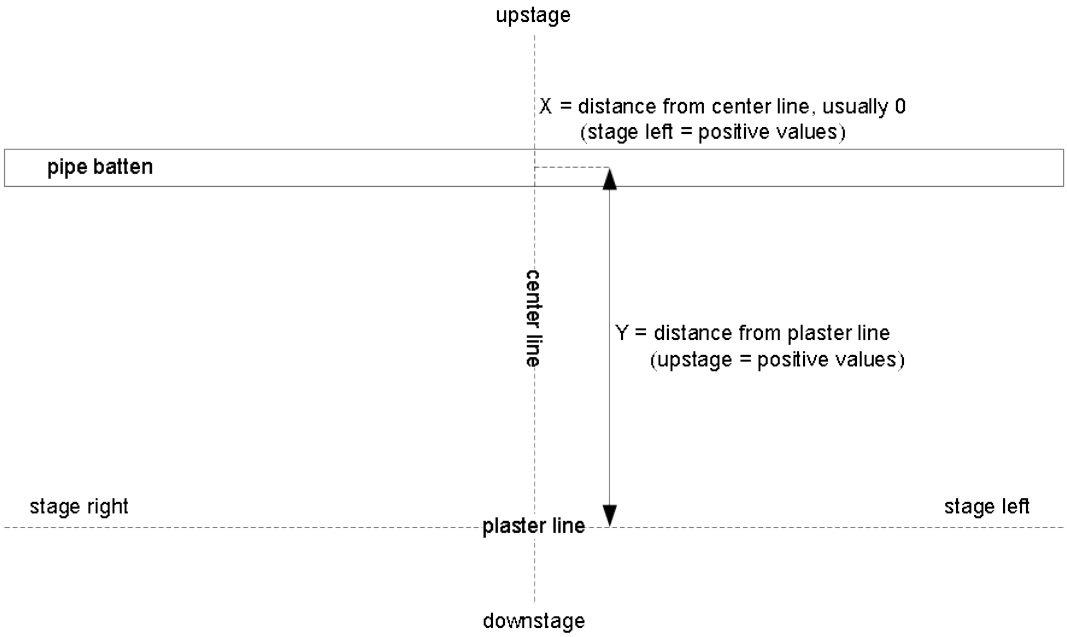
The location of a conventional line-set shall be described as:

x: distance from center line to middle of pipe (this value is usually 0)
y: distance from plaster line to center of pipe

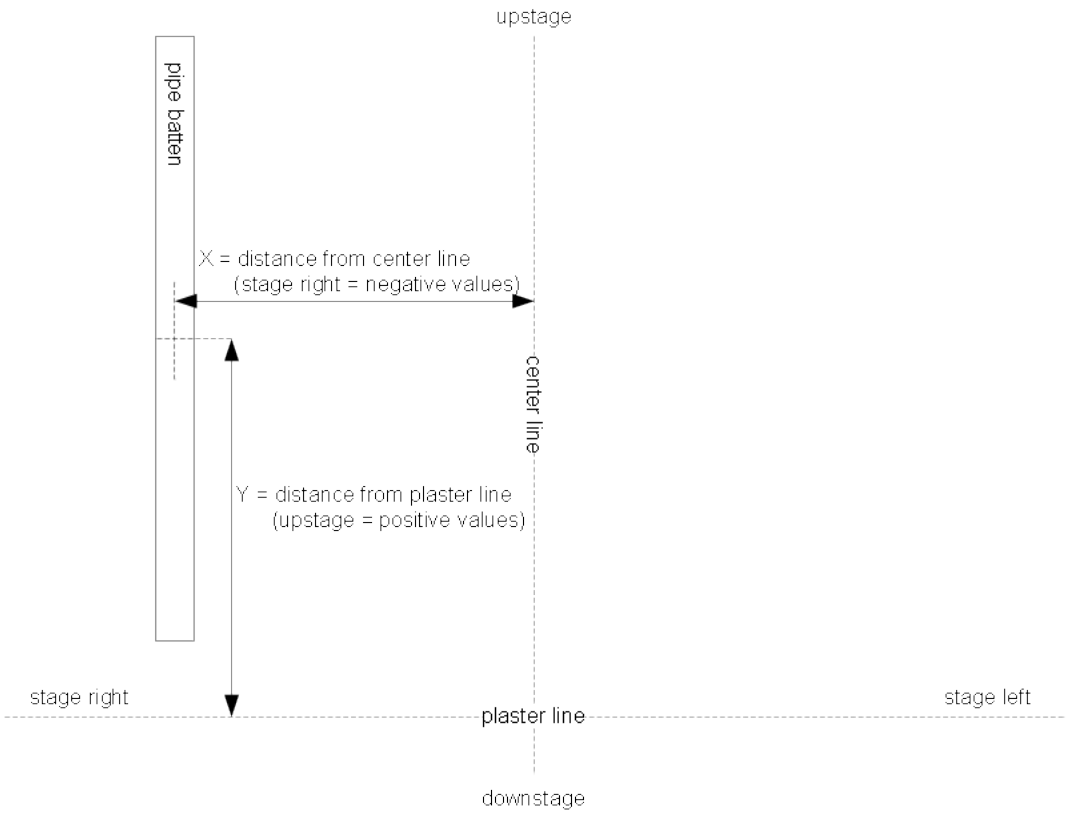
At this point in time, there are 2 types of line-sets defined within the standard:

cross stage: orientation of the batten is parallel to the plaster line
upstage-downstage: orientation of the batten is parallel to the center line

Line-sets with other orientations or curved line-sets shall be described as type “other”, but the same position method shall be employed for line-sets that are installed in different orientations or angles.



Picture 4: plan view, cross stage line-set location

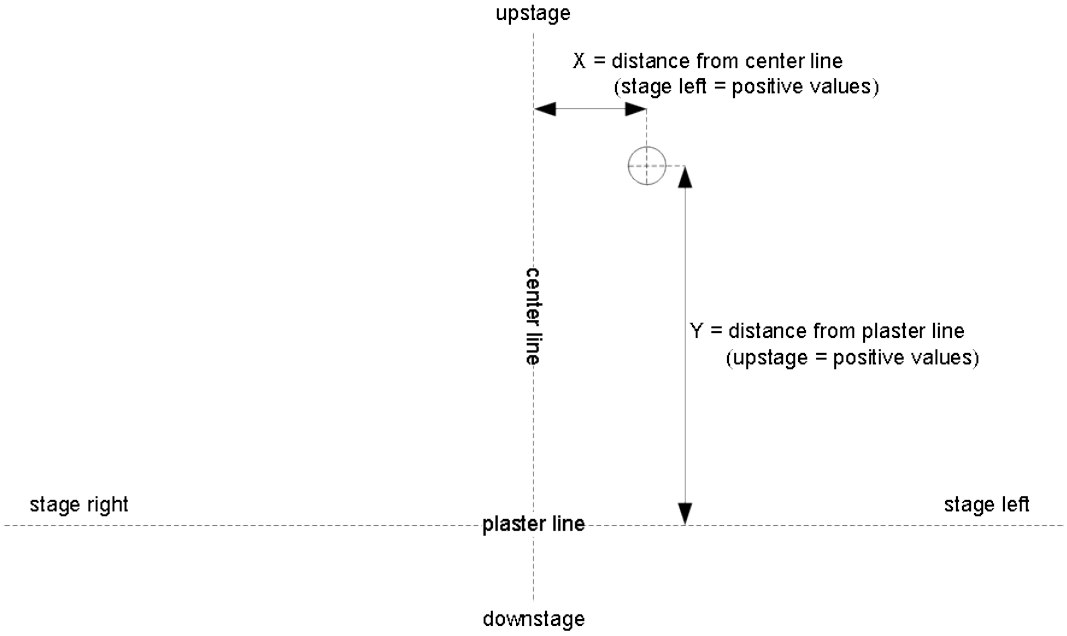


Picture 5: plan view, upstage-downstage line-set location

5.3.1.1.2 Location of Point Hoists

For point hoists, the same location principles shall apply.

x: distance from center line to center of hook
y: distance from plaster line to center of hook



Picture 6: plan view, location of point hoist

5.3.1.1.3 Location of other Machinery

For other machinery like deck winches, elevators or revolves, the location information is only of secondary concern, since the placement of equipment is either completely variable and very show specific (e.g. deck winches) or the number of machines is very limited (e.g. revolves), or both. For this reason the selection and patch of these machines in the target venue is not a complex task.

The location of the machines is mainly utilized at show-file import in order to give the end user guidance on which machines should be used in the target venues. With these kind of other machines the assignment and patching can easily and swiftly be done in a manual fashion.

The location data for other machinery in a show file shall either be left out of the show file or set to the machinery location of the source system.

5.3.1.2 Trim Positions for Axes

All axis positions shall use absolute values in trims throughout this standard.
The values for a trim position shall meet the requirements described in the following sections.

5.3.1.2.1 Positions for Lifting Machinery

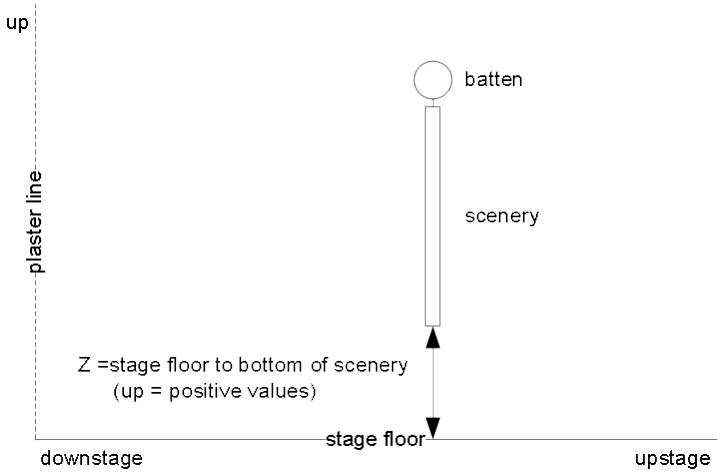
The trim reference values for lifting machinery used in the show file shall be the distance between the lowest point of the attached scenery and the production floor.

The production floor shall either be the normal stage floor, a temporary production floor, or the floor of a raked stage (see pictures 7,8,9).

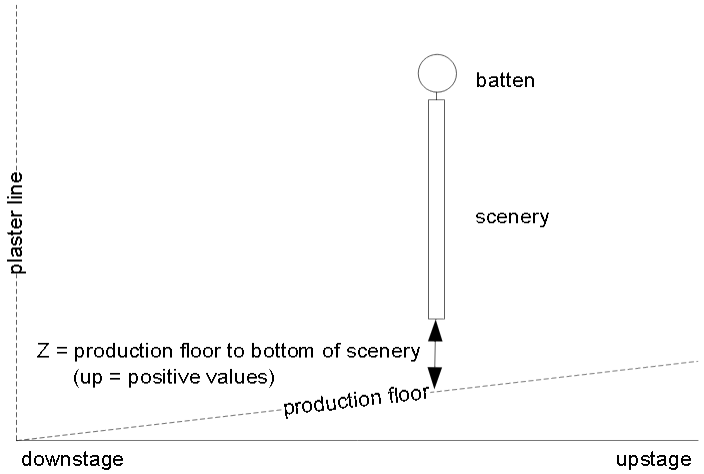
A trim value of 0.00mm shall indicate that the lowest point of the attached scenery touches the production floor.

For stages with elevators, the distance between the lowest point of the scenery and the production floor mounted on the lift shall be taken with the elevator at the normal stage floor level and the production floor in place. (usually 0.00mm).

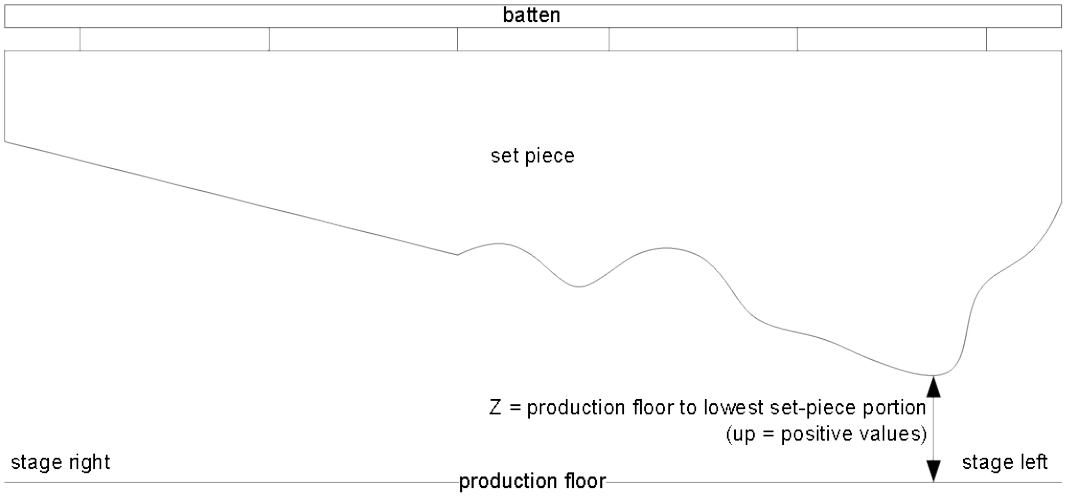
For battens exclusively used to support lighting equipment (electrics), the trim reference values shall be the distance between the production floor and the lowest point of the load carrying device (the bottom of the batten) (see Picture 10).



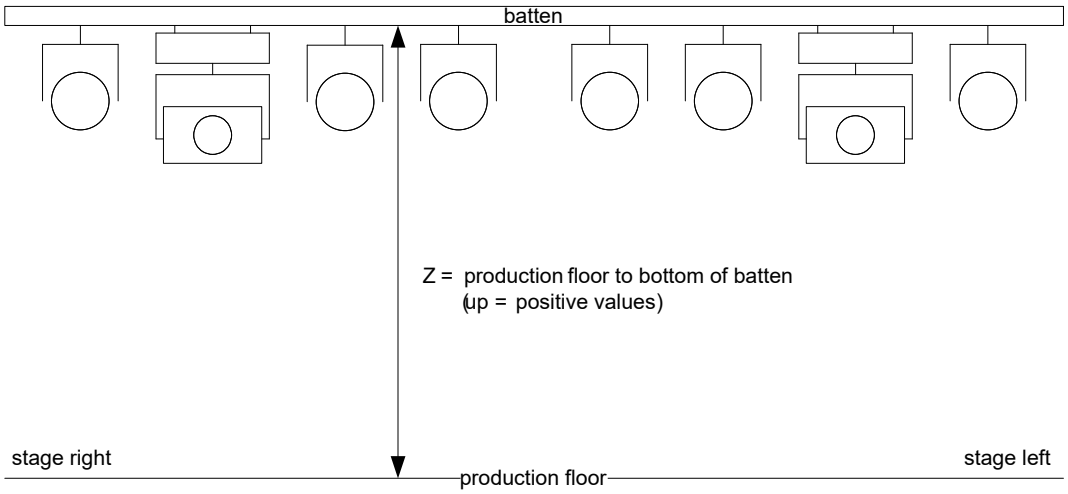
Picture 7: side view, elevation for trims of lifting machinery on a flat stage



Picture 8: side view, elevation for trims of lifting machinery on a raked stage



Picture 9: front view, elevation for trims of lifting machinery for uneven scenery



Picture 10: front view, elevation for trims of lifting machinery for lighting battens

5.3.1.2.2 Positions for Deck Winches

Deck winches with a scenery position reference of 0.00mm shall indicate an attached item that is in the fully deployed “standard” stage location.

The off stage “storage” location shall be indicated by positive position numbers.

5.3.1.2.3 Positions for Curtain machines and travelers

Curtains

The position reference for curtains shall be 0.00mm for a fully closed curtain.
An open curtain shall be presented by positive position numbers.
Overlapping curtains shall be presented by negative position numbers.

Travelers

The position reference for travelers shall indicate 0.00mm for a fully deployed item.
Once traveler moves towards the “off-stage” position, the position shall have a positive number.

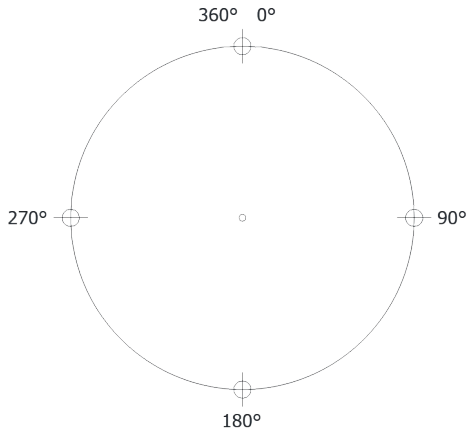
5.3.1.2.4 Positions for Other Machines

The general rule for position reference on other machines shall meet the following guidelines where sensible:

- A position reference of 0.00mm shall indicate an item that is in the deployed “standard” production state, visible to the audience.
- A readout of positive position numbers shall be given in the “un-deployed” or the “storage” state.

5.3.1.2.5 Positions for Rotating machines

Position information for rotating axes (e.g. Revolves) shall be given in degrees.
Absolute positions shall utilize the compass degree system (see picture 11).
The degree numbers shall increase when rotating in a clockwise fashion, as seen in plan view.



Picture 11, rotating machine compass degree reference system

For axes that provide absolute position readouts, the zero degree reference point shall either be the point “farthest away from the audience” for horizontally mounted rotating machines (revolves), or the topmost point for vertically mounted machines.

There are two types of rotating machines, machines with and without end stops.

Machines that are limited in their rotation and do have end-stops shall continue to count their angular positions above 360°and below 0°.

Example:

On a machine that allows for one complete revolution, the travel limits shall be set for example to 0° and 360° or to -180° and 180°, depending where the 0° reference is.

On an machine that allows for two complete revolutions, the travel limits shall be set for example to

0° and 720° or to -360° and 360°, depending where the 0° reference is.

Machines that are not limited in their rotation can be rotated in a continuous and permanent fashion.

Example:

On a machine that rotated 3 complete rotations + 10° at some point in time, the position would read 1090° without the limitation above. If the end user now asks for a position of 0° the real intention would be to rotate it by 10°, not 3 full rotations and 10°. A limitation of the rotational values between 0° to 360° prevents this limitation.

5.3.1.3 Movement of Axes

Stage machinery control systems utilizing this standard allow the programming of movements of axes. Each programmed move allows individual parameters for each axis in terms of target position, start delay, acceleration-ramp, travel speed and deceleration-ramp. The target positions can be references, direct values or increments from the current position.

Additional to this basic movement type, it is also possible to program continuous movements (e.g. for conveyer belts or revolves). With rotary machines, it is necessary to provide additional information describing how to get to a specific angular position using clockwise movement, counterclockwise movement or the shortest angular distance.

5.3.1.3.1 Movement of a linear Axis

Programmed moves for linear axes allow for three different movement types:

- linear starts a linear movement towards the programmed target.
- continuous_increasing starts a continuous move in a direction towards larger position numbers.
- continuous_decreasing starts a continuous move in a direction towards smaller position numbers.

The target of a linear move can be programmed in several different ways (types):

- limit: the target is a referenced limit of this axis
- trim: the target is a referenced trim of this axis
- absolute: the target is a un-referenced position stored in this move
- relative: the target is calculated from the current position plus the increment value stored in this move

Once a continuous move of a linear axis is started, it can be stopped again by any subsequent programmed move by:

- programming a move to a specific target:
    - The axis shall move to the target of this move
    - The axis shall use the speed of this move
    - The change to this speed shall be achieved with the programmed accel-ramp of this move (independent if the new speed is smaller or larger than the current speed)
    - The axis shall stop with the programmed decel-ramp of this move
    - In this instance the axis will stop at a defined position

- starting a continuous move with a speed of 0
    - The axis shall directly initiate a slowdown with the programmed decel-ramp
    - The axis shall stop at the end of the decel-ramp
    - In this instance, the axis will stop at an undefined position

Starting a continuous move of an axis, while the axis is already moving

- shall use the direction of this move command
- shall use the speed of this move command
- shall change the current speed to the new speed of this move command using the accel-ramp (no matter if the new speed is smaller or larger than the current speed)

5.3.1.3.2 Movement of a rotary Axis

Programmed moves for rotary axes allow for five different movement types:

- rotary_cw starts a move to the target in a clockwise direction
- rotary_ccw starts a move to the target in a counter clockwise direction

- rotary_shortest starts a move to the target by covering the smallest angular distance
- continuous_increasing starts a continuous move in a clockwise direction (towards larger degree numbers)
- continuous_decreasing starts a continuous move in a counterclockwise direction (towards smaller degree numbers)

The target of a rotary move can be programmed in several different ways (types):

- limit: the target is a referenced limit of this axis
- trim: the target is a referenced trim of this axis
- absolute: the target is an un-referenced position stored in this move
- relative: the target is a the current position plus increment value stored in this move

Important: these target types and the respective positions only determine the intended target position. The rotation direction for this axis to get to the target shall be determined by the movement type.

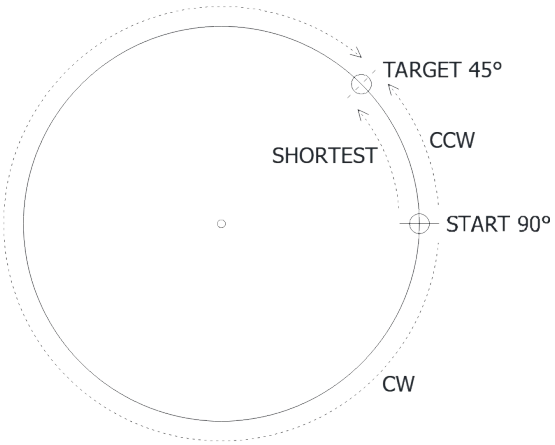
Once a continuous move of a rotary axis is started, it can be stopped again by any subsequent programmed move by:

- programming a move to a specific target:
  - The axis shall move to the target of this move
  - The axis shall use the speed of this move
  - The change to this speed shall be achieved with the programmed accel-ramp of this move (independent if the new speed is smaller or larger than the current speed)
  - The axis shall stop with the programmed decel-ramp of this move
  - In this instance the axis will stop at a defined position

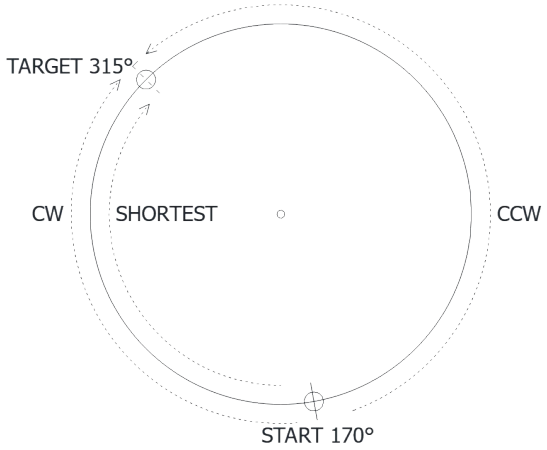
- starting a continuous move with a speed of 0
  - This axis shall directly initiate a slowdown with the programmed decal-ramp
  - This axis shall stop at the end of the decel-ramp
  - In this instance, the axis will stop at an undefined position

Starting a continuous move of an axis, while the axis is already moving

- shall use the direction of this move command
- shall use the speed of this move command
- shall change the current speed to the new speed of this move command using the accel-ramp (no matter if the new speed is slower or faster than the current speed)



Picture 12, Example of different movement path' from 90° to 45°



Picture 13, Example of different movement path' from 170° to 315°

5.3.2 Axes Section

The optional axes section describes the machinery with locations and capabilities of the source venue on which the show file was originally programmed. This information is purely informative and can be utilized by the target system software at the point of show file import to help the end user to make educated decisions about which machines to use in the new venue.

5.3.2.1 Axes Data Section

The following structure contains the data described above

```
<b_axes>

        <b_axis b_id="12">
                <b_name>General Purpose</b_name>
                <b_notes>1000lb 180ft/min</b_notes>
                <b_interactive_decision_point>potential text can go here
                </b_interactive_decision_point>

                <b_type>lineset_cs</b_type>
                <!-- lineset_cs  = lineset stage-left, stage-right orientation  -->
                <!-- lineset_ud  = lineset upstage, downstage orientation       -->
                <!-- point_hoist = chain or rope point hoist                    -->
                <!-- other       = other machinery (revolve, lift, deck-winch)  -->

                <b_location>           <!-- in millimeters                       -->
                        <b_x>0</b_x>     <!-- center line  to middle of batten    -->
                        <b_y>300</b_y>   <!-- plaster line to middle of batten    -->
                </b_location>

                <b_length>20000</b_length>           <!-- length of batten       -->

                <b_positioning>yes</b_positioning>   <!-- axis has an encoder    -->

                <b_low_limit>1000</b_low_limit>      <!-- distance from deck in mm -->
                <b_high_limit>15000</b_high_limit>   <!-- distance from deck in mm -->


                <b_speed_type>variable</b_speed_type><!-- speed can be controlled-->
                <b_max_speed>900</b_max_speed>       <!-- speed in mm/s         -->
                <b_max_accel>2500</b_max_accel>      <!-- ramps in mm/s2        -->
                <b_max_decel>2500</b_max_decel>      <!-- ramps in mm/s2        -->

                <b_max_load>450</b_max_load>         <!-- load in kg            -->

        </b_axis>

        <b_axis b_id="2">
                <!-- axis 2 information -->
        </b_axis>

        <!-- more axes go here -->
```

```
</b_axes>
```

XML Example 3: Axes section

Structure	Possible Elements / Attributes	required / optional
b_axes	b_axis	required

Structure	Possible Elements / Attributes	required / optional
b_axis	b_id	required
	b_name	optional
	b_notes	optional
	b_interactive_decision_point	optional
	b_type	optional
	b_location	optional
	b_length	optional
	b_positioning	optional
	b_low_limit	optional
	b_high_limit	optional
	b_speed_type	optional
	b_max_speed	optional
	b_max_accel	optional
	b_max_decel	optional
	b_max_load	optional

Structure	Possible Elements / Attributes	required / optional
b_location	b_x	required
	b_y	required

<b_axes>	Tree	Type
	<b_showfile><b_machinery>	structure
contains	data describing the axes (machinery) of the source system.	

<b_axis>	Tree	Type
	<b_showfile><b_machinery><b_axes>	structure
contains	data describing a single axis (machine) of the source system.	

<b_id>	Tree	Type
	<b_showfile><b_machinery><b_axes><b_axis>	unsigned integer
contains	an identification number that is utilized to identify the described axis throughout the file system.	

<b_name>	Tree	Type
	<b_showfile><b_machinery><b_axes><b_axis>	string
contains	a text field that can be utilized to name this axis.	

<b_notes>	Tree	Type
	<b_showfile><b_machinery><b_axes><b_axis>	String
contains	a text field that can be utilized to add notes relevant to this axis.	

<b_interactive_decision_point>	Tree	Type
	<b_showfile><b_machinery><b_axes><b_axis>	String
contains	a text field that can be utilized to add notes to explain additional data that cannot be mapped to the structures provided by this standard. This can be utilized at the show file import to guide the user on how to program certain items on the target control system.	

<b_type>	Tree	Type
	<b_showfile><b_machinery><b_axes><b_axis>	string enum
contains	identification of the type of axis. The defined types are: lineset_cs: a lineset orientated in parallel to the plaster line lineset_ud: a lineset orientated in parallel to the center line point_hoist: a hoist with a single point load carrying device rotary: a rotary machine (e.g. revolve) other: all other types of machines (e.g. deck winches, lifts, elevators)	

<b_location>	Tree	Type
	<b_showfile><b_machinery><b_axes><b_axis>	structure
contains	contains the plan view location coordinates of the load carrying device.	

<b_x>	Tree	Type
	<b_showfile><b_machinery><b_axes><b_axis><b_location>	integer in mm
contains	the X location of the load carrying device. See "Location of Machinery" section for more details	

<b_x>	Tree	Type
	<b_showfile><b_machinery><b_axes><b_axis><b_location>	integer in mm
contains	the Y location of the load carrying device. See " Location of Machinery" section for more details.	

<b_length>	Tree	Type
	<b_showfile><b_machinery><b_axes><b_axis>	integer in mm
contains	the length of the load carrying device. For lineset type machines, this field contains the length of a batten, For rotary type machines, this field contains the diameter of the revolving disc. for other machines, this entry is not required or if included shall be set to 0.	

<b_positioning>	Tree	Type
	<b_showfile><b_machinery><b_axes><b_axis>	string enum
contains	this field identifies if the machine has an encoder and is capable of positioning. yes: axis can be sent to a certain position. no: axis has no positioning means.	

<b_low_limit>	Tree	Type
	<b_showfile><b_machinery><b_axes><b_axis>	float in mm or degrees
contains	for “linear” machines, the low limit position of the load carrying device, in millimeters. for “rotating” machines, the lowest counter clockwise end point, in degrees	

<b_high_limit>	Tree	Type
	<b_showfile><b_machinery><b_axes><b_axis>	float in mm or degrees
contains	for “linear” machines, the high limit position of the load carrying device, in millimeters. for “rotating” machines, the highest clockwise end point, in degrees	

<b_speed_type>	Tree	Type
	<b_showfile><b_machinery><b_axes><b_axis>	string enum
contains	the axis speed type: fixed: the machine once activated travels with a constant velocity that cannot be changed by the control system. variable: the machine’s speed can be controlled by the control system.	

<b_max_speed>	Tree	Type
	<b_showfile><b_machinery><b_axes><b_axis>	float in mm/s or degrees/s
contains	the maximum speed the machine is capable of moving. for “linear” machines in mm/s. for “rotary” machines in degrees/s	

<b_max_accel>	Tree	Type
	<b_showfile><b_machinery><b_axes><b_axis>	float in mm/s^2 or $degrees/s^2$
contains	the maximum acceleration ramp the machine is capable of producing. for “linear” machines in mm/s^2. for “rotary” machines in $degrees/s^2$	

<b_max_decel>	Tree	Type
	<b_showfile><b_machinery><b_axes><b_axis>	float in mm/s^2 or $degrees/s^2$
contains	the maximum deceleration ramp the machine is capable of producing for “linear” machines in positive mm/s^2 for rotary machines in positive $degrees/s^2$	

<b_max_load>	Tree	Type
	<b_showfile><b_machinery><b_axes><b_axis>	integer in kg
contains	The maximum load axis is capable of lifting, pulling or supporting.	

5.3.3 Groups Section

The group section contains information about groups of axes that are utilized in the production.

The file format shall allow the definition of 3 types of groups: free, safe and locked.

A group may contain information about a "Master Axis" and "Axis Offset".

5.3.3.1 Free Groups

In free groups, all axes move independently from each other without any synchronization.
A fault on one axis in the group shall not stop any other axis of the group.
Axes of this group can move in different directions.
In this group type, it is not necessary to provide a master axis or axis offset information.

5.3.3.2 Safe Groups

In safe groups, all axes can move independently from each other without any synchronization.
A fault on one axis of the group shall stop all other axes in the group.
Axes of this group can move in different directions.
In this group type it is not necessary to provide a master axis or axis offset information.

5.3.3.3 Locked Groups

In locked groups, all axes shall move in a distance-synchronized fashion.
A fault on one axis of the group shall stop all other axes in the group.
Axes in this group shall only move in the same direction at the same speed, traveling the same distance.
In this group type it is required to provide axis offset information.
Group trim and target information shall be applied to the Master Axis only.

5.3.3.4 Master Axis

A Master Axis becomes important for groups of machines which are used to lift bigger set-pieces in a coordinated fashion. If the inner workings of the control system allows for axis synchronization, the Master Axis may be utilized in locked groups as the source of synchronization for travel distance and speed.
Also, if a synchronized group of axes is sent to a specific trim, the trim position shall be applied to the Master Axis.
All other axes in this group shall be positioned with a specific position offset (Axis Offset).

5.3.3.5 Axis Offset

The Axis Offset data provides information about the magnitude of the position difference a certain axis has from the Master Axis. The offset can be positive or negative.
With locked groups, the control system shall maintain this offset during synchronized movements and standstill within the accuracy limitations of the respective control system. If no offset number is provided, an offset of 0.0 shall be assumed.

```
<b_groups>

        <b_group b_id="1">
                <b_name>big old heavy set-piece</b_name>
                <b_notes>caution when loading this</b_notes>
                <b_interactive_decision_point>potential text can go here
                </b_interactive_decision_point>

                <b_type>locked</b_type>              <!-- free   = independent axes         -->
                                                     <!-- safe   = one fault stops all axes -->
                                                     <!-- locked = full synchronization     -->
                <b_speed_limit>800</b_speed_limit>   <!-- speed in mm/s -->
                <b_master_axis b_id="10"/>           <!-- position reference axis -->
                                                     <!-- in locked mode for synchronization -->

                                                     <!-- collection of axes in this group -->
                <b_axis b_id="10">
                        <b_offset>200</b_offset>
                </b_axis>

                <b_axis b_id="15">
                        <b_offset>185</b_offset>
```

```
                </b_axis>

                <b_axis b_id="20">
                        <b_offset>-293</b_offset>
                </b_axis>

                <b_axis b_id="25">
                        <b_offset>-13</b_offset>
                </b_axis>

        </b_group>

        <b_group b_id="2">
                <!-- group 2 information -->
        </b_group>

        <!-- more groups go here -->

</b_groups>
```

XML Example 4: Groups Section

Structure	Possible Elements / Attributes	required / optional
b_group	b_id	required
	b_name	optional
	b_notes	optional
	b_interactive_decision_point	optional
	b_type	required
	b_speed_limit	optional
	b_master_axis	required
	b_axes	required

Structure	Possible Elements / Attributes	required / optional
b_axes	b_id	required
	b_offset	optional

<b_group>	Tree	Type
	<b_showfile><b_machinery><b_groups>	structure
contains	information of the group, its content and properties.	

<b_id>	Tree	Type
	<b_showfile><b_machinery><b_groups><b_group>	integer
contains	the identification number of the group.	

<b_name>	Tree	Type
	<b_showfile><b_machinery><b_groups><b_group>	string
contains	a text field that can be utilized to name this group.	

<b_notes>	Tree	Type
	<b_showfile><b_machinery><b_groups><b_group>	string
contains	a text field that can be utilized to add notes relevant to this group.	

<b_interactive_decision_point>	Tree	Type
	<b_showfile><b_machinery><b_axes><b_axis>	string
contains	a text field that can be utilized to add notes to explain additional data that cannot be mapped to the structures provided by this standard. This can be utilized at the show file import to guide the user on how to program certain	

	items on the target control system.

<b_type>	Tree	Type
	<b_showfile><b_machinery><b_groups><b_group>	string enum
contains	the type of this group. If a target control system does not support all types, the next higher type shall be utilized (if 'free' is required, using 'safe' or 'locked' would be a safe option) free: independent axes, a fault on an axis does not stop other axes of the group safe: a fault on any axis of the group stops all axes of the group locked: full position synchronization of all axis in the group, a fault on any axis of the group stops all axes of the group	

<b_speed_limit>	Tree	Type
	<b_showfile><b_machinery><b_groups><b_group>	float in mm/s or degrees/s
contains	the maximum speed that that should not be exceeded when moving this group of axes. for "linear" axis in mm/s for rotary axis in degrees/s	

<b_master_axis>	Tree	Type
	<b_showfile><b_machinery><b_groups><b_group>	structure
contains	the id of the master axis of the groups. This axis is taken as the position reference of the group both for display and targeting purposes. In locked groups, depending on the system implementation, this axis provides the axis synchronization reference for this group.	

<b_id>	Tree	Type
	<b_showfile><b_machinery><b_groups><b_group><b_master_axis>	integer
contains	the id of the master axis of the group.	

<b_axis>	Tree	Type
	<b_showfile><b_machinery><b_groups><b_group>	structure
contains	an axis id that is member of the group.	

<b_id>	Tree	Type
	<b_showfile><b_machinery><b_groups><b_group><b_axes>	integer
contains	the id number of the axis contained in the group.	

<b_offset>	Tree	Type
	<b_showfile><b_machinery><b_groups><b_group><b_axis>	float in mm or degrees
contains	the relative position offset to the master axis. for "linear" axis in mm for rotary axis in degrees	

5.3.4 Scenery Section

This section describes the scenery that is used in the production and is attached to the various axes.
It also contains trim references (e.g. high / low trim, Trim 3) that can be utilized in cues as references.

Since it is anticipated that scenery will be attached to different axes in different venues, it is important to have a separate description of the scenery.

```
<b_scenery>
```

```
	<b_object b_id="1">

		<b_name>Forrest</b_name>
		<b_notes>The Big Green Thing</b_notes>
		<b_interactive_decision_point>potential text can go here
		</b_interactive_decision_point>

		<b_height>5150</b_height>
		<!-- height of set-piece + attachment hardware in mm -->

		<b_weight>60</b_weight>			<!-- weight in kg -->
		<b_speed_limit>500</b_speed_limit>

		<b_trims>
			<b_lowtrim>				<!-- low and high trim also act as limits -->
				<b_name>SLL</b_name>
				<b_notes>In</b_notes>
				<b_position>0</b_position>
				<!-- production floor to bottom of scenery in mm -->
			</b_lowtrim>

			<b_hightrim>
				<b_name>SUL</b_name>
				<b_notes>Out</b_notes>
				<b_position>5340</b_position>
				<!-- production floor to bottom of scenery in mm -->
			</b_hightrim>

			<b_trim b_id="1">
				<b_name>Trim 1</b_name>
				<b_notes>half way up</b_notes>
				<b_position>2506</b_position>
				<!-- production floor to bottom of scenery in mm -->
			</b_trim>

			<!-- more trims for this object go here -->
		</b_trims>

	</b_object>

	<!-- more scenery goes here -->

</b_scenery>
```

XML Example 5: Scenery Section

Structure	Possible Elements / Attributes	required / optional
b_object	b_id	Required
	b_name	optional
	b_notes	optional
	b_interactive_decision_point	optional
	b_height	optional
	b_weight	optional
	b_speed_limit	optional
	b_trims	optional

Structure	Possible Elements / Attributes	required / optional
b_trims	b_lowtrim	optional
	b_hightrim	optional
	b_trim	optional

Structure	Possible Elements / Attributes	required / optional
b_lowtrim, b_hightrim	b_name	optional
	b_notes	optional
	b_position	required

Structure	Possible Elements / Attributes	required / optional
b_trim	b_id	required
	b_name	optional
	b_notes	optional
	b_position	required

<b_object>	Tree	Type
	<b_showfile><b_machinery><b_scenery>	structure
contains	information of the scenery object, limits, trims properties.	

<b_id>	Tree	Type
	<b_showfile><b_machinery><b_scenery><b_object>	integer
contains	the identification number of the scenery object.	

<b_name>	Tree	Type
	<b_showfile><b_machinery><b_scenery><b_object>	string
contains	a text field that can be utilized to name this scenery object.	

<b_notes>	Tree	Type
	<b_showfile><b_machinery><b_scenery><b_object>	string
contains	a text field that can be utilized to add notes relevant to this scenery object.	

<b_interactive_decision_point>	Tree	Type
	<b_showfile><b_machinery><b_axes><b_axis>	string
contains	a text field that can be utilized to add notes to explain additional data that cannot be mapped to the structures provided by this standard. This can be utilized at the show file import to guide the user on how to program certain items on the target control system.	

<b_height>	Tree	Type
	<b_showfile><b_machinery><b_scenery><b_object>	unsigned integer in mm
contains	the height of the scenery object including the attachment hardware. This height can be utilized to calculate the actual batten position by adding this value to the trim position.	

<b_weight>	Tree	Type
	<b_showfile><b_machinery><b_scenery><b_object>	unsigned integer in kg
contains	the weight of the attached scenery object. This weight can be utilized at show file import to decide which axis provides the load capacity for this scenery object.	

<b_trims>	Tree	Type
	<b_showfile><b_machinery><b_scenery><b_object>	structure
contains	a collection of trims for this scenery object	

<b_lowtrim>	Tree	Type
	<b_showfile><b_machinery><b_scenery><b_object><b_trims>	structure
contains	a trim position which can be referenced in cues that also acts as a temporary soft lower limit.	

<b_hightrim>	Tree	Type
	<b_showfile><b_machinery><b_scenery><b_object><b_trims>	structure
contains	a trim position which can be referenced in cues that also acts as a temporary soft upper limit.	

<b_trim>	Tree	Type
	<b_showfile><b_machinery><b_scenery><b_object><b_trims>	structure
contains	a generic trim position which can be referenced in cues	

<b_name>	Tree	Type
	<b_showfile><b_machinery><b_scenery><b_object><b_trims><b_lowtrim> <b_showfile><b_machinery><b_scenery><b_object><b_trims><b_hightrim> <b_showfile><b_machinery><b_scenery><b_object><b_trims><b_trim>	string
contains	a text field that can be utilized to name a trim.	

<b_note>	Tree	Type
	<b_showfile><b_machinery><b_scenery><b_object><b_trims><b_lowtrim> <b_showfile><b_machinery><b_scenery><b_object><b_trims><b_hightrim> <b_showfile><b_machinery><b_scenery><b_object><b_trims><b_trim>	string
contains	a text field that can be utilized to add notes relevant to this trim.	

<b_position>	Tree	Type
	<b_showfile><b_machinery><b_scenery><b_object><b_trims><b_lowtrim> <b_showfile><b_machinery><b_scenery><b_object><b_trims><b_hightrim> <b_showfile><b_machinery><b_scenery><b_object><b_trims><b_trim>	float in mm or degrees
contains	the trim position in millimeters. A trim position of 0.00mm represents that the scenery touches the production floor (details on how these numbers are measured, see section “Trim Positions for Axes)	

<b_id>	Tree	Type
	<b_showfile><b_machinery><b_scenery><b_object><b_trims><b_trim>	unsigned integer
contains	the identification and reference number for the trim.	

5.3.5 Patch Section

This section describes the relationship between scenery and the axes or groups used in the production.

Each scenery object shall be linked to exactly one axis or one group. Linking an object to multiple axes shall not be allowed since a group is available for this requirement.

```
<b_patch>

        <b_interactive_decision_point>potential text can go here
        </b_interactive_decision_point>

        <!-- Example one object moved by one machine (standard situation) -->
        <b_object b_id="1" b_axis="5"/>

        <!-- Example one object moved by one group -->
        <b_object b_id="2" b_group="1"/>

</b_patch>
```

XML Example 6: Patch Section

Structure	Possible Elements / Attributes / Attributes	required / optional
b_patch	b_interactive_decision_point	optional
	b_object	required

Structure	Possible Elements / Attributes	required / optional
b_Object	b_id	required
	b_axis	required (only if not group)
	b_group	required (only if not axis)

<b_interactive_decision_point>	Tree	Type
	<b_showfile><b_machinery><b_axes><b_axis>	string
contains	a text field that can be utilized to add notes to explain additional data that cannot be mapped to the structures provided by this standard. This can be	

	utilized at the show file import to guide the user on how to program certain items on the target control system.

<b_object>	Tree	Type
	<b_showfile><b_machinery><b_patch>	structure
contains	information of the scenery object and what axis or group it is connected to.	

<b_id>	Tree	Type
	<b_showfile><b_machinery><b_patch>	unsigned integer
contains	the identification number of the scenery object.	

<b_axis>	Tree	Type
	<b_showfile><b_machinery><b_patch><b_object>	unsigned integer
contains	the axis information to which the scenery object is connected to.	

<b_group>	Tree	Type
	<b_showfile><b_machinery><b_patch><b_object>	unsigned integer
contains	the axis information to which the scenery object is connected to.	

5.3.6 Cue Section

This section describes the cue structure of the production or in other words, where does certain scenery need to be at a certain time in the show and how does the scenery get there.
This structure contains a list of cues and each cue holds a list of scenery that needs to move in this cue.
The position information of where scenery needs to be can either be direct position numbers in the cue or references to trims from the respective scenery.
The information about how the scenery gets to the specified position is described for each piece of scenery.

Since every control system is working in a different fashion, the intention of this standard is only to provide the most common information for a cue structure. Advanced and manufacturer specific information is not defined within this standard.

This standard provides the "Interactive Decision Point" data tag that allows the source system to include information into the file as a human readable text string that describes the intent of a certain cue, if it is not possible to map all the data to the structures defined in this standard.

```
<b_cues>
        <b_cue>
                <b_number>1.00</b_number>
                <b_name>Set-up</b_name>
                <b_notes>This cue moves everything to the default position</b_notes>

                <b_interactive_decision_point>potential text can go here
                </b_interactive_decision_point>

                <b_stack>2</b_stack>

                <b_object b_id="2">
                        <b_user>3</b_user>
                        <b_playback>2</b_playback>

                        <b_move_type>linear</b_move_type>

                        <b_start>
                                <b_type>limt</b_type>
                                <b_limit>hightrim</b_limit>
                        </b_start>

                        <b_target>
                                <b_type>trim</b_type>         <!-- limit, trim, absolute, relative -->
```

```
                        <b_trim>lowtrim</b_trim>
                        <b_delay>0.0</b_delay>
                        <b_time>10</b_time>
                        <b_accel>1000</b_accel>
                        <b_speed>700</b_speed>
                        <b_decel>1000</b_decel>
                </b_target>
        </b_object>

        <b_object>
                <!-- additional scenery objects for this cue go here -->
        </b_object>

</b_cue>

<b_cue>
        <b_number>2.00</b_number>
        <b_name>main curtain open</b_name>
        <b_notes>curtain changes speed during opening</b_notes>

        <b_object b_id="2">
                <b_move_type>linear</b_move_type>

                <b_start>
                        <b_type>limt</b_type>
                        <b_limit>lowtrim</b_limit>
                </b_start>

                <b_target>
                        <b_type>absolute</b_type>     <!-- limit, trim, absolute, relative -->
                        <b_position>8000</b_position>
                        <b_speed>700</b_speed>
                </b_target>
        </b_object>
</b_cue>

<b_cue>
        <b_number>3.00</b_number>
        <b_name>Manual Control</b_name>
        <b_notes>this cue allows manual control of scenery object 3</b_notes>

        <b_object b_id="3">
                <b_move_type>joystick</b_move_type>
                <b_playback>3</b_playback>            <!-- use joystick 3 -->
        </b_object>
</b_cue>

<b_cue>
        <b_number>4.00</b_number>
        <b_name>Relative Control</b_name>
        <b_notes>this cue moves scenery object 7 100mm down</b_notes>

        <b_object b_id="7">
                <b_move_type>linear</b_move_type>

                <b_target>
                        <b_type>relative</b_type>     <!-- limit, trim, absolute, relative  -->
                        <b_distance>-100</b_distance>
                        <b_speed>10</b_speed>
                </b_target>

        </b_object>
</b_cue>
</b_cues>
```

XML Example 7: Cue Section

Structure	Possible Elements / Attributes	required / optional
b_cue	b_number	required
	b_name	optional

	b_notes	optional
	b_interactive_decision_point	optional
	b_stack	optional
	b_trigger	optional
	b_object	required

Structure	Possible Elements / Attributes	required / optional
b_object	b_id	required
	b_user	optional
	b_playback	optional
	b_move_type	optional
	b_start	optional
	b_target	required (if move_type = linear or multi-target)

Structure	Possible Elements / Attributes	required / optional
b_start	b_type	required
	b_limit	required (if type = limit)
	b_trim	required (if type = trim)
	b_position	required (if type = absolute)

Structure	Possible Elements / Attributes	required / optional
b_target	b_type	required
	b_limit	required (if type = limit)
	b_trim	required (if type = trim)
	b_position	required (if type = absolute)
	b_distance	required (if type = relative)
	b_delay	optional
	b_time	optional
	b_accel	optional
	b_decel	optional
	b_speed	required

<b_cue>	Tree	Type
	<b_showfile><b_machinery><b_cues>	structure
contains	information of a cue.	

<b_number>	Tree	Type
	<b_showfile><b_machinery><b_cues><b_cue>	string
contains	the number of the cue stored in the format "*major.minor*" the major number shall not exceed 3 digits and can be in the range of 1 to 999. the minor number shall not exceed 2 digits and can be in the range of 0 to 99.	

<b_name>	Tree	Type
	<b_showfile><b_machinery><b_cues><b_cue>	string
contains	a text field that can be utilized to name this cue.	

<b_notes>	Tree	Type
	<b_showfile><b_machinery><b_cues><b_cue>	string
contains	a text field that can be utilized to add notes relevant to this cue.	

<b_interactive_decision_point>	Tree	Type
	<b_showfile><b_machinery><b_cues><b_cue>	String
contains	a text field that can be utilized to add notes to explain additional data that cannot be mapped to the structures provided by this standard. This can be utilized at the show file import to guide the user on how to program certain items on the target control system	

<b_stack>	Tree	Type
	<b_showfile><b_machinery><b_cues><b_cue>	unsigned integer
contains	the number of the active cue stack for this cue. if this value is not present, the default cue stack shall be used.	

<b_object>	Tree	Type
	<b_showfile><b_machinery><b_cues><b_cue>	structure
contains	information of a scenery object that is programmed to move in this cue.	

<b_id>	Tree	Type
	<b_showfile><b_machinery><b_cues><b_cue><b_object>	unsigned integer
contains	the reference number to the scenery object.	

<b_user>	Tree	Type
	<b_showfile><b_machinery><b_cues><b_cue><b_object>	unsigned integer
contains	information on which user or physical console is utilized to play this part of the cue. If this information is not present, the default user / console shall be used.	

<b_playback>	Tree	Type
	<b_showfile><b_machinery><b_cues><b_cue><b_object>	unsigned integer
contains	information on which playback this part of the cue / this scenery object is loaded. If this information is not present, the default playback shall be used.	

<b_move_type>	Tree	Type
	<b_showfile><b_machinery><b_cues><b_cue><b_object>	string enum
contains	a definition on what movement type is utilized to move the scenery object in this cue. linear: a direct move to the target with programmed accel-, velocity and decel-ramps. rotary_ccw: for rotary axes a: direct counter clockwise move with programmed accel,- velocity and decal-ramps rotary_cw: for rotary axes a: direct clockwise move with programmed accel,- velocity and decal-ramps	

	rotary_shortest: for rotary axes a: direct move with the shortest angle with programmed accel,- velocity and decal-ramps continuous_increasing: for axes without end-stops (e.g. rotary, conveyer belts): the start of a continuous move in the direction of larger position or degree numbers with programmed accel-ramp and velocity continuous_decreasing: for axes without end-stops (e.g. rotary, conveyer belts): the start of a continuous move in the direction of smaller position or degree numbers with programmed accel-ramp and velocity joystick: the scenery object is connected to manual joystick control in this cue. The joystick utilized shall be identified by the “playback” entry.

<b_start>	Tree	Type
	<b_showfile><b_machinery><b_cues><b_cue><b_object>	structure
contains	information on where the move for this scenery object should start from. If this data is not present, the position where the object stopped in the last cue this object was moved shall be utilized as the start position.	

<b_type>	Tree	Type
	<b_showfile><b_machinery><b_cues><b_cue><b_object><b_start>	string enum
contains	the type of the start position. limit: a reference to a limit stored in the scenery object is used as start position. trim: a reference to a trim stored in the scenery object is used as start position. absolute: an absolute position is used as start position.	

<b_limit>	Tree	Type
	<b_showfile><b_machinery><b_cues><b_cue><b_object><b_start> <b_showfile><b_machinery><b_cues><b_cue><b_object><b_target>	string
contains	A reference to the limit position name defined in the scenery object.	

<b_trim>	Tree	Type
	<b_showfile><b_machinery><b_cues><b_cue><b_object><b_start> <b_showfile><b_machinery><b_cues><b_cue><b_object><b_target>	unsigned integer
contains	A reference to the trim position id defined in the scenery object.	

<b_position>	Tree	Type
	<b_showfile><b_machinery><b_cues><b_cue><b_object><b_start> <b_showfile><b_machinery><b_cues><b_cue><b_object><b_target>	integer in mm or degrees
contains	an absolute position as defined in the “Trim Positions of Axes” section that is used as a target.	

<b_target>	Tree	Type
	<b_showfile><b_machinery><b_cues><b_cue><b_object>	structure
contains	information about where the axis needs should be at the end of the cue	

<b_type>	Tree	Type
	<b_showfile><b_machinery><b_cues><b_cue><b_object><b_target>	string enum
contains	the type of the target position.	

	limit: a reference to a limit stored in the scenery object is used as target position trim: a reference to a trim stored in the scenery object is used as target position absolute: an absolute position is used as target position relative: a distance from the current position is used as target position

<b_distance>	Tree	Type
	<b_showfile><b_machinery><b_cues><b_cue><b_object><b_target>	float in mm or degrees
contains	an absolute distance in mm or degrees. The target shall be calculated from the current position with this distance added to it.	

<b_delay>	Tree	Type
	<b_showfile><b_machinery><b_cues><b_cue><b_object><b_target>	float in seconds
contains	the time from the trigger of the cue to the start of movement of the scenery object. Range from 0.0 to 999.99	

<b_time>	Tree	Type
	<b_showfile><b_machinery><b_cues><b_cue><b_object><b_target>	float in seconds
contains	the total time this cue should take to complete from actuation of the go button to the standstill of the longest running machine started by this cue. This is purely informative since all cues shall be stored on a speed basis. However, this time can be utilized by the control system to re-calculate speeds if the targets or start positions of an object in a cue have changed due to different dimensions of the target venue. Range from 0.0 to 999.99	

<b_accel>	Tree	Type
	<b_showfile><b_machinery><b_cues><b_cue><b_object><b_target>	float in mm/s^2 or $degrees/s^2$
contains	contains the acceleration ramp of this move.	

<b_decel>	Tree	Type
	<b_showfile><b_machinery><b_cues><b_cue><b_object><b_target>	float in mm/s^2 or $degrees/s^2$
contains	contains the deceleration ramp of this move.	

<b_speed>	Tree	Type
	<b_showfile><b_machinery><b_cues><b_cue><b_object><b_target>	float in mm/s or degrees/s
contains	contains the speed of this move. If the move distance is too short to reach this speed with the given ramps, not exceeding the ramps shall take precedence over reaching this speed.	

ANNEX A, Supplemental Information

This annex is not part of the requirements of this standard and is included for informational purposes only. It contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.1 Example Show File

```
<?xml version="1.0" encoding="UTF-16">
<DOCTYPE showfile>
<!-- link to DTD on ESTA server -->

<showfile>

   <header>
      <show_name>ESTA Machinery Showfile Example</show_name>
      <notes>This is the first ESTA E1.44 draft Idea</notes>
      <user>Joe Operator</user>

      <date>
         <year>2011</year>
         <month>6</month>
         <day>23</day>
         <hour>17</hour>         <!-- 24 hour clock notation-->
         <minute>47</minute>
         <second>24</second>
      </date>

      <versions>             <!-- Versions included in this data file -->
         <version>ESTA-E1.44-2013</version>  <!-- Basic E1.44 Standard -->
         <version>ESTA-E1.XX-2019</version>  <!-- Future Extensions    -->

                     <!-- Manufacturer specific data -->
         <version>STL-Sculptor-V2.0-2013</version>
         <version>DAK-V1.0-2013</version>
         <version>FTSI-Navigator-V3.0-2013</version>
         <version>JRC-V1.0-2013</version>
         <version>ETC-V1.0-2013</version>
         <version>NIS-V1.0-2013</version>
         <version>TSC-V1.0-2013</version>
      </versions>
   </header>

   <b_machinery>

      <b_axes>
         <b_axis b_id="12">
            <b_name>General Purpose</b_name>
            <b_notes>1000lb 180ft/min</b_notes>
            <b_interactive_decision_point>potential text can go here
            </b_interactive_decision_point>

            <b_type>lineset_cs</b_type>
               <!-- lineset_cs  = lineset stage-left, stage-right orientation  -->
               <!-- lineset_ud  = lineset upstage, downstage orientation       -->
               <!-- point_hoist = chain or rope point hoist                    -->
               <!-- other       = other machinery (revolve, lift, deck-winch)  -->

               <b_location>           <!-- in millimeters                      -->
                  <b_x>0</b_x>        <!-- center line  to middle of batten    -->
                  <b_y>300</b_y>      <!-- plaster line to middle of batten    -->
               </b_location>

               <b_length>20000</b_length>   <!-- length of batten       -->

               <b_positioning>yes</b_positioning> <!-- axis has an encoder    -->

               <b_low_limit>1000</b_low_limit>    <!-- distance from deck to batten in mm -->
               <b_high_limit>15000</b_high_limit> <!-- distance from deck to batten in mm -->


               <b_speed_type>variable</b_speed_type>               <!-- speed can be controlled-->
               <b_max_speed>900</b_max_speed>  <!-- speed in mm/s  -->
               <b_max_accel>2500</b_max_accel> <!-- ramps in mm/s2 -->
```

```
      <b_max_decel>2500</b_max_decel>  <!-- ramps in mm/s2 -->

      <b_max_load>450</b_max_load>     <!-- load in kg     -->

   </b_axis>

   <b_axis b_id="2">
      <!-- axis 2 information -->
   </b_axis>

   <!-- more axes go here -->
</b_axes>


<b_groups>

   <b_group b_id="1">
      <b_name>big old heavy set-piece</b_name>
      <b_notes>caution when loading this</b_notes>
      <b_interactive_decision_point>potential text can go here
      </b_interactive_decision_point>

      <b_type>locked</b_type>    <!-- free   = independent axes         -->
                                 <!-- safe   = one fault stops all axes -->
                                 <!-- locked = full synchronization     -->
      <b_speed_limit>800</b_speed_limit>  <!-- speed in mm/s -->
      <b_master_axis b_id="10"/> <!-- position reference axis -->
                                 <!-- in locked mode for synchronization -->

                                 <!-- collection of axes in this group -->
      <b_axis b_id="10">
         <b_offset>200</b_offset>
      </b_axis>

      <b_axis b_id="15">
         <b_offset>185</b_offset>
      </b_axis>

      <b_axis b_id="20">
         <b_offset>-293</b_offset>
      </b_axis>

      <b_axis b_id="25">
         <b_offset>-13</b_offset>
      </b_axis>

   </b_group>

   <b_group b_id="2">
      <!-- group 2 information -->
   </b_group>

   <!-- more groups go here -->

</b_groups>
```

```
<b_scenery>
   <b_object b_id="1">
      <b_name>Forrest</b_name>
      <b_notes>The Big Green Thing</b_notes>
      <b_interactive_decision_point>potential text can go here
      </b_interactive_decision_point>

      <b_height>5150</b_height>
      <!-- height of set-piece + attachment hardware in mm -->

      <b_weight>60</b_weight>    <!-- weight in kg -->
      <b_speed_limit>500</b_speed_limit>

      <b_trims>
         <b_lowtrim>       <!-- low and high trim also act as limits -->
            <b_name>SLL</b_name>
            <b_notes>In</b_notes>
            <b_position>0</b_position>
            <!-- production floor to bottom of scenery in mm -->
         </b_lowtrim>

         <b_hightrim>
            <b_name>SUL</b_name>
            <b_notes>Out</b_notes>
            <b_position>5340</b_position>
            <!-- production floor to bottom of scenery in mm -->
         </b_hightrim>

         <b_trim b_id="1">
            <b_name>Trim 1</b_name>
            <b_notes>half way up</b_notes>
            <b_position>2506</b_position>
            <!-- production floor to bottom of scenery in mm -->
         </b_trim>

         <!-- more trims for this object go here -->
      </b_trims>

   </b_object>
   <!-- more scenery goes here -->
</b_scenery>


<b_patch>
   <b_interactive_decision_point>potential text can go here
   </b_interactive_decision_point>

   <!-- Example one object moved by one machine (standard situation) -->
   <b_object b_id="1" b_axis="5"/>

   <!-- Example one object moved by one group -->
   <b_object b_id="2" b_group="1"/>
</b_patch>


<b_cues>
   <b_cue>
      <b_number>1.00</b_number>
      <b_name>Set-up</b_name>
      <b_notes>This cue moves everything to the default position</b_notes>

      <b_interactive_decision_point>potential text can go here
      </b_interactive_decision_point>

      <b_stack>2</b_stack>
```

```
         <b_object b_id="2">
            <b_user>3</b_user>
            <b_playback>2</b_playback>

            <b_move_type>linear</b_move_type>

            <b_start>
               <b_type>limt</b_type>
               <b_limit>hightrim</b_limit>
            </b_start>

            <b_target>
               <b_type>trim</b_type>      <!-- limit, trim, absolute, relative -->
               <b_trim>lowtrim</b_trim>
            <b_delay>0.0</b_delay>
            <b_time>10</b_time>
            <b_accel>1000</b_accel>
            <b_speed>700</b_speed>
            <b_decel>1000</b_decel>
         </b_target>
      </b_object>

      <b_object>
         <!-- additional scenery objects for this cue go here -->
      </b_object>
   </b_cue>

   <b_cue>
      <b_number>2.00</b_number>
      <b_name>main curtain open</b_name>
      <b_notes>curtain changes speed during opening</b_notes>

      <b_object b_id="2">
         <b_move_type>linear</b_move_type>

         <b_start>
            <b_type>limt</b_type>
            <b_limit>lowtrim</b_limit>
         </b_start>

         <b_target>
            <b_type>absolute</b_type>  <!-- limit, trim, absolute, relative -->
            <b_position>8000</b_position>
            <b_speed>700</b_speed>
         </b_target>
      </b_object>
   </b_cue>

   <b_cue>
      <b_number>3.00</b_number>
      <b_name>Manual Control</b_name>
      <b_notes>this cue allows manual control of scenery object 3</b_notes>

      <b_object b_id="3">
         <b_move_type>joystick</b_move_type>
         <b_playback>3</b_playback>    <!-- use joystick 3 -->
      </b_object>
   </b_cue>
```

```
         <b_cue>
            <b_number>4.00</b_number>
            <b_name>Relative Control</b_name>
            <b_notes>this cue moves scenery object 7 100mm down</b_notes>

            <b_object b_id="7">
               <b_move_type>linear</b_move_type>

               <b_target>
                  <b_type>relative</b_type>  <!-- limit, trim, absolute, relative  -->
                  <b_distance>-100</b_distance>
                  <b_speed>10</b_speed>
               </b_target>


            </b_object>
         </b_cue>
      </b_cues>
   </b_machinery>
</showfile>
```

XML Example 8: Example show file