Design Course

**Exposure Sheet**
Animation Techniques
by
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IDC, IIT Bombay

Source:
http://www.dsource.in/course/exposure-sheet

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Introduction

In the production process of any kind of animation (2D or 3D) the story is broken down into chunks called sequence. Each scene consists of smaller chunks called scenes.

There are multiple people working on a scene/sequence in a production pipeline, so it becomes necessary to have everyone follow a common set of instructions.

Exposure sheet/ X-sheet is a tool used in animation which contains instructions to be followed for a particular scene. It contains notes about the action, timing, camera movement and additional footnotes as required. In old studio environment, x-sheet also served as an indispensable communication tool between the studio and the cameraman who'd shoot the final cels into film.

Since this helps the animator to create a map of the animation for others to follow, it is also popularly called a Cheat Sheet or Dope Sheet.

You can act out a scene physically before you start doing the thumbnails, you can scrub through the audio and time out exactly at which frame each vowel sound happens, and you can time out the actions the character makes according to the audio.

But once all of this is laid out on an x-sheet, it becomes much easier to manage all of this and keep all those things in perfect synchronization.
A Basic X-SHEET Template

A basic template of an x-sheet comprises of a table with several rows and columns. Each row represents one frame of animation. A classic x-sheet holds up to 4 seconds of animation, i.e. 96 rows.

(Many classic x-sheets also have markings for Footage, i.e. 6 feet of the film reel, and 1 foot = 16 frames.)

The sheet then has the following columns:

**Action**
This column holds the timing planned out for the scene, how long the scene should take; and also the action of the character, at what point would the character have a particular pose.

Some animators also annotate the key and breakdown poses within this column to make the action clearer.

**Dial**
The dial holds the breakdown of the pre-recorded dialogue (or the beats of the music in case of no dialogue) to know at which frame to hit a certain phoneme.

**Cel Levels**
There are generally five of those columns, each representing one layer of cel, meaning to say one x-sheet can hold up to 5 layers of animation, although these many are never usually required.

**Background**
This column has the background numbers and for how long to hold one and when to switch to another.

**Camera**
The commands for the camera are put down in this column. If you want the camera to pan, or zoom in or just shake, all of that goes in here.
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Source:
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Conventions

The movies and animations that we watch are generally shot 24 frames per second, i.e. 24 fps.

If we draw 24 drawings for one second, with each drawing held for 1 frame, the animation is said to be on Ones.
If we draw 12 drawings for one second, with each drawing held for 2 frames, the animation is said to be on Twos.

While animating, you need a combination of both. It is best to animate on twos while reserving ones for very fast actions.

So while numbering your drawings on the x-sheet while animating on twos, always use odd numbers, subsequently skipping every next row; and when you want to smooth something out or need a very fast action, just add in the ones with even numbers.

If you want to hold a drawing for a specific number of frames, just indicate it with a straight line, and then get back to the next odd number respective to the frame number.
X-SHEET in Modern Animation Softwares

X-sheets and their usage have also evolved with the way animation is produced.

Modern day animation softwares (like ToonBoom, Adobe Flash, Autodesk Maya) have a tool called Timeline, which in many ways is similar to the x-sheet, but more interactive. You can move your key frames around and adjust your timing easily, and you can also have your recorded audio for animation on another layer and move frame by frame on it.

Although a handful of them still have the classic x-sheet built into them along with the timeline (like ToonBoom and Autodesk Maya), as it provides a clearer and simpler overview.
Nonetheless, be it 2D animation or 3D animation, it is always better to have your animation planned out on paper first, with all the key poses and the timing and spacing worked out. Hence, having a physical x-sheet always comes in handy.
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Video

Exposure Sheet
Exposure Sheet - Filling X-sheet
Exposure Sheet - Animation
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Contact Details

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