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STUDIO TALKS

(Series 1)

Composition ------ Chas. Phillippi
Staging ---------- Ken O'Connor
Sound Recording -- Sam Slyfield

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COMPOSITION

By: Charles Phillippi

(Illustrations referred to may be found at the end of this talk)

This discussion is to be on Composition, Rendering and Layout Mechanics. In previous discussions I've been holding it mostly to Composition and getting into layout mechanics a little later. Tonight we'll try to go through the whole works. It is not a lecture - it's a getting together of all the fellows for a discussion. I have no right to stand here and lecture to any of you fellows because I'm no authority on composition or rendering or layout mechanics, but it is for discussion. I hope you will take it in that light. I can only give you my own reactions and my own experience, and what I would say is not to be taken as a law. It is merely my own impression.

I've found that composition is a rather hard subject to talk about. I can't give a definition. You can read lots of books about composition and they will cover volumes on composition -- composition by itself. I don't believe, personally, that there are any "rules" because the way I understand a rule is that it

is something that cannot be broken. Principles, I believe, are adaptations of ideas which can be used.

In the books you read you find there are rules for making pictures. One of the definite "rules" they have in any book you might read is that every picture must have a main center of interest, and also must have secondary interests which bolster up and support the main center of interest. I can certainly agree with that very heartily. You must have a center of interest in your drawing, your painting or your layout, that attracts the eye where you want it to be attracted I can agree to that.

Then they say that your main center of interest must not be in the center of the picture, or that it must not be in any of the four corners of the picture or that you must not divide your picture equally horizontally or vertically. They all sound like very fine ideas in the way of "rules", which they are; but they can be broken and we've done them here and we've seen many paintings which have broken those rules and they look very good. For instance in a painting it is possible to put a figure in the center of the canvas (FIG. 1) and, by lighting and grouping of objects, figures, or masses, so balance the composition to make the result entirely pleasing (FIG. 2).

In our work here if you have a single character in the scene as in a closeup scene, I would say that the balance of weight of that character should not be in the center of the picture. Have his weight off center. Have more "feeling of space" in the front than in the back of him (FIG 3), especially in a dialogue scene, otherwise it tends to cramp the character and his action.

I think the very elementary explanation of composition is the basis of the whole thing. Take a very simple example: draw three trees in a row equal distance apart and all the same size (FIG. 4). That would be perfect mathematical balance, but not very artistic.

Now rearrange them as in Figure 5 and you will have taken the first steps toward producing a more artistic composition, still maintaining balance. Then if you move one tree back of the other (FIG. 6) you have created a feeling of depth. If you move another tree forward, you've created a still greater feeling of depth in your picture (FIG. 7). That's where perspective comes into it. Color up one of these trees and

you've given it tone or contrast (FIG. 8). If you add a road going into the picture you've created the impression of movement, and also a feeling of depth (FIG. 9).

So it would be safe to say composition is composed of contrast, balance, and movement, associated with perspective and depth. Those very basic principles are the basis of all of our pictures, and from there we build. You'll find if you overlap more objects you'll create more feeling of depth (FIG. 10). The best depth producing compositional lines are the receding, tapering lines that represent planes that are not horizontal or vertical to the picture plane, (FIG. 11 and 12). They produce the greatest feeling of distance to the observer. The "tunnel" form of composition is another trick to produce the feeling of depth and is illustrated by Fig. 13 and 14.

Then you go a little farther and you find you want to control the eye. You don't want the eye roving all around. As an example, take four straight lines and put them horizontally into a rectangle, (FIG. 15). The eye does

travel, but the eye wanders about back and forth, out of the picture and back again. It isn't controlled in any way. If you take the four straight lines and rearrange them, (FIG. 16) the eye follows those lines in a sort of an explorative circle, and it is controlled inside the picture. Then if you take some different sized, unequal black masses (FIG. 17) you find that the eye goes to one black mass and stops there and then it goes to the next and stops and then to the next and stops. The eye jumps in this case -- it doesn't travel. From these simple diagrams it should be safe to say that the linear form is used for moving the eye from one place to another smoothly within the picture, and the mass form is used to hold the eye. A good composition leads the eye from place to place within the borders of the picture with the center of interest the main attraction.

By using these forms in our pictures -- the basic forms -- we can control the eye and have it go where we wish it to go. As an example of that we might take the scene of the

three little pigs' house on the hill (FIG. 11). The linear form controlled the eye; the mass form held it.

The action that we design has to be thought of in the way of composition. The action creates mental paths of action in the observer's mind and these paths of action must be designed and composed well. I'll try to make it a little more clear. As I said before, receding lines leading back into the picture create depth. We can design action that does the same thing. A character can run back into the picture plane (FIG. 18) and the path of action of the character creates in your mind the same receding line effect, although there is no actual line going back.

The composition of movement may be used to direct attention to the center of interest. Perhaps you remember a scene in SNOW WHITE where the little animals were creeping up to her as she lay on the ground (FIG. 19). The path of the action of the animals made mental lines toward Snow White which made the eye look at Snow White. The eye was not distracted because the mental

path created was orderly and pointed to a common converging point -- Snow White. Just the reverse was true when she screamed and all the animals scattered in all directions to provide shock for the audience (FIG. 20).

The books on composition usually contain numerous diagramatic drawings purporting to show exactly the various compositional lines arrived at by the Old Masters. Perhaps the Old Masters used certain compositional forms such a s the circle, the triangle or the cross. But I do not believe that they deliberately made a detailed map of the basic compositional lines, FIRST OF ALL, and then started the painting. I think that the fact that the finished painting can be diagramed for compositional treatment doesn't prove that the artist had that same diagram in mind when he started his painting.

I believe he visualized in his mind what he wished to portray and then started in to make rough sketches of his idea, and these drawings were changed and changed until he got what pleased him as to position of masses, contrast and flow of line. I believe it was

the inherent good taste, artistic judgement and experience of the artist that produced the painting of perfect balance and symmetry rather than any predetermined, set, diagramatic form.

In one of the meetings, one of the fellows said that he made a painting and it was hung in an art museum. People came in and viewed it and the art director explained to them with compositional diagramatic lines how the picture had been made. It was great news to him -- he didn't know that he had made it that way.

Composition is a matter of experience and a matter of feeling. An actor has to feel his part, when he acts. I believe you have to "feel" your composition, just as an actor has to feel and live his part to do it successfully, you have to work yourself up to that intense emotion to portray it. I don't think you can do it by form or rule or anything else like that. It is an acquisition that comes into you, or becomes part of you, after much experience.

An old artist told me a long time ago that a good picture is three parts light and one part shadow, or three parts shadow and one part light. It works either way.

Another thing this old artist said: In making a picture or painting, there should be a way of getting into the picture and a way of getting out. The next time you are looking at reproductions of paintings, notice how often you see the idea in the above statement resorted to.

Nicholas Haas has written a book called "Emphasis." It is a theorized way of explaining emphasis. It is a very interesting book from the theory standpoint. I'll attempt to go through a little of it. He says that in making a picture certain images are made more important than others, because we want them to carry our idea or our interest, and others are subdued, because they do not carry the main interest and are used to help our main idea. Images are emphatic because of some power of attraction over all the other images in the same picture. The more attention we can attract to one image on place in a picture, the more emphatic that image or place becomes.

He says that every picture can be reduced to its fundamental unit - a spot or a dot. You can break the masses down to a line and break the line down to a spot or a dot. This spot has certain visible difference compared to itself or to another spot or to the picture plane that it is on. He says there are twelve visible differences that can be seen by anyone. Then there are seven more which can be present according to the will, skill or good luck of the artist.

The first twelve he calls existence, number, size, position, shape, line, tone, edge, rhythm, unity, clarity, emphasis. The seven more are surface, color, depth, motion, duration, balance and harmony. Then he goes ahead to explain these visible differences, and shows by repetition how the emphasis is changed. (FIG. 21)

In explaining existence he says this spot is emphatic because it is in space by itself and you're attracted to look at that spot because something surrounded by bare space is naturally attractive and it is the only one of its kind there and you look at it. But by repetition --

if you add lots of spots and leave one out, then the space becomes emphatic. By repetition you can change your emphasis in the picture. It is that way all down the line.

Number -- he says your eye is attracted to the large numbers, then jumps to the smaller numbers and then to the one and back to the large numbers. But if you have a large number of one kind and just one of another, then the one of its own kind is the emphatic one in the picture.

Size -- he says, if you have a large object and a smaller object, the large object is emphatic, but if, by repetition, you add many large objects then the one is emphatic.

Position -- he says the one in the center is emphatic because it is easy to see and because it is isolated while the one in the corner is cramped against the frame. But if you have a lot of spots of the same kind and one off at the side, the eye will go to that one.

Shape -- in most cases, the simple geometrical shape is more attractive than than the very fancy, irregular shape. But

by repetition or addition of a large number of simple geometrical shapes behind the irregular shape, the eye then goes to the irregular shape.

Line -- on this one it's your choice -- I felt the straight line was the most emphatic over the curved line. By the addition of many straight lines and one vertical, then the vertical becomes emphatic. By criss-crossing all these lines the curved line becomes emphatic.

Tone -- black on white or on gray is more emphatic than gray on white. But among many black and white images, a gray one will be emphatic. A man in a grey suit at a full dress ball is embarrassingly emphatic.

Color -- a brilliant spot on white is more emphatic than a black or gray on white. If you had many brilliant spots and one black or gray spot, then the black or gray spot is emphatic.

Edge -- the sharp edge is emphatic over the one with the soft edge. Then increase the sharp edges and the one with the soft edges becomes emphatic.

Surface and Texture -- a rough surfaced spot on a smooth surface is more attractive than a semi-rough one. But among many rough surfaced spots on a smooth surface, a semi-rough one will stand out.

Depth -- the near object is the most emphatic because you have been trained to watch things that are near to you and your eye goes to that first. But if you increase the number of things that are near to you, then the one off in the distance becomes emphatic.

Motion -- if you have a still figure and a running figure, the running figure becomes emphatic. But if you have many running figures and one still one, the eye goes to that still one. This last one is a well-known trick of actors. The scene stealer is the actor that is moving all over the place while everybody is still; or if everybody is moving he stands still.

Then the book goes on and gets very deep. I only mention it as a thought stimulator.

We ran a couple of reels of the picture "Becky Sharpe" the other day, which contained some good examples of bad composition. I also had the last reel of "Rembrandt" which contains

many examples of good composition. In "Becky Sharpe" there was probably some reason why they did the things they did. It was rather apparent in their scenes that they weren't watching where the heads of their actors came. They would have people grouped in front of a big spreading potted palm tree and it appeared as though the palms were coming out of the tops of the heads (FIG. 22). They would also stop them where a strong set of architectural vertical lines cut down right in front of their faces (FIG. 23). They would have two characters in the scene and a big vase up in the middle separating the characters (FIG. 24). It has been said they weren't paying much attention to composition in that picture, but were worried about color.

Before we get on this I would like to say that I believe the eye goes to the head and eyes of the characters and that is why I think we ought to be careful about those areas behind and around the head and the eyes. If that gums up your action, the scene is hard to look at, especially in regular moving pictures. I think

the explanation is that if you talk to a person you generally look at his eyes and your attention is drawn to the head. If the head is mixed up with some kind of important, strong detail, it is hard to see and that spoils the staging.

If other things in the scene get more prominent than the characters you have a bad effect. We should stage our action first and then make a background to fit it. The action is more important, not the background. That is a pretty broad statement, but generally I think it is true. I think we, as layout men, are trying to display the action in the scene. We're using the background to bolster up that action or to supply a mood or figuring to make the thing read or convey a n idea better. It is our aim not to detract from the characters but to enhance them, to set them off and produce a feeling of space in front, around and behind them. If we gum up the action or spoil the story point with a background we're defeating the purpose we started out with, I think. As

a general thing I would say to watch the heads and the eyes of the characters so that they don't get all messed up.

Going back a little, I said earlier that one of the "rules" for making pictures was that it wasn't a good idea to put your main center or interest in the corner. In "Becky Sharpe" they did that a lot -- they would place one of their leading characters down in the corner of the field looking up to other groups farther up in the field. It certainly wasn't good staging in that case, and then the rule would certainly hold good.

On the other hand, you might say you've got a scene of Geppetto sitting on the floor with a lighted candle. The fact that he moves really makes him the center of interest. But if that was a painting, I think the center of interest would be down around the candle. By the balance of lighting in that scene it looks good, and would be breaking one of those rules. I think generally our cartoon characters are our main center of interest because the eye goes to the moving object rather than the stationary object, but even then our backgrounds must

be well composed. We can do it here I think to a greater advantage than the moving picture companies can. For instance in "Becky Sharpe" if they ran the dailies and found bad composition, they would have to call many people for retakes. We can call for a rough reel, check it, and with a few changes correct it. I should think, due to the way we work, our pictures should contain the highest quality of compositional values. There is no reason why we can't. It just depends upon our ability and our ingenuity of design.

On the screen the cartoon moves faster than straight photography moves, so it has to be clear and readable. I personally don't know any way of testing a pose better than the "silhouette" way. In other words, if you draw a pose expressing the idea of a gag, and you black it all in, and it is readable, you know it would be readable on the screen. For instance, if a fellow takes his watch out of his pocket, front view, you cannot tell what it is. But if he does it side view, in sillhouette, you get it.

If you want to stage mystery or atmosphere, it is better not to stage it too clearly. In gag action, it should be clarity; and in mystery atmosphere, it should be reversed -- not too clear, and leave a lot to the imagination.

Mere accuracy has no art value whatever. Some of the most pathetic things in the world of art are the pictures or statues whose only virtue is accuracy. The bare truth may be a deadly commonplace. We should look for character-- that includes all truth and all beauty. It leads one to seek for the best handling, and to value power of expression above success in drawing.

Do not attempt to make anything in a picture stand out from the frame; the endeavor should be rather to make your distances recede farther and farther from the spectator. A great deal of the art of composition is to so select and arrange things that they hold their proper place in the landscape.

A strong foundation of good drawing, establishing light and shade and values either in the mind or by indications in the rough, must be done before rendering can be done. Rendering up a bad drawing is worse than no drawing at all.

Art study is the attempt to perceive and create fine relations of line, mass and color. As fine relations can be understood only through appreciation, the whole approach should be based on a training of appreciation. This power cannot be imparted like information. Artistic skill cannot be given by dictation or acquired by reading. It does not come by merely learning to draw, by imitating Nature, or by any process of storing the mind with facts. The power is within. Increase of power always comes with exercise. If one uses a little of his appreciative faculty in simple ways, he is in line for natural growth. Effective progress in composition depends upon building one experience upon another, calling for cultivated judgement to discern and decide upon finer and finer relations.

One of the greatest difficulties in rendering a drawing is to tell when to stop. Experience only seems to advise as to when you have worked enough. It might be said that as soon as the effect you have desired has been obtained, the picture is finished, and all other lines are unnecessary.

We are instinctively blind to what is not relative, we are not a camera. We select. When you are sitting in conversation with a young girl, and are thinking how beautiful she is, suddenly stop and ask yourself what is the background behind her. Surely it was not all those incongruous things that are now leaping into your consciousness from behind her. And surely, too, while you are sitting there and thinking her so beautiful, you had created (unconsciously) out of chaos a wonderfully fitting setting which was back of her and around her, and fully sufficient to her.

In ordinary life we see backgrounds right, in fact, as they are. When we start drawing we are apt to destroy the background by putting in the multitude of things behind the character.

Never start shading or touching up without first considering whether the object to be presented by this shading is in light or shadow. Your drawing should enable a spectator to know instantly whether it is in light or shadow.

In making a layout ask yourself a lot of questions. Does it have a main center of interest, and if it doesn't, why not? Is the scene irritating or satisfying? Is your composition good? If it is irritating, there is usually something wrong with the composition and if it is irritating, what makes it irritating? Try to find out. Does it have two centers of interest? If it does, you can correct that. Is it lit properly? Does the eye go where you want it to go? If it doesn't go where you want it to go, you can correct that by lighting or placing of masses. Watch out for light spots away from the center of interest, they are going to attract the eye and take it away. I think it is a good idea not to repeat the main areas of mass two or three times in a composition, that is, don't have a prominent cloud, the same mass area as, say, a group of trees, etc. Break them up in size.

In defining composition, it may be said that the aim is to produce a feeling of symmetry without the masses and lines being in fact symmetrical.

I want to call your attention to a set of books we have in the library now about Japanese screens. Those old fellows really knew something about what we call "pans." With the panels all showing the complete screen has interest and good composition, yet each one of these panels has a good composition and a good picture of its own. The screen can be folded in any way and yet there is still good composition and a good picture.

Their problem of screen design is applicable to our pans. We have to work for composition on our pans and our stop positions. We have to get a feeling or a flow of movement and design. Evidentally the idea is not new by a long ways. It is interesting to get these books and look them over.

In one talk I gave a long time ago, I said that I considered one-quarter of an inch a fast pan. I still do, but not in the direct sense of the wording of that statement. I consider it a fast pan mentally in the way I lay out the pan. It would be a danger signal to me in the spacing of objects. Slower than that speed I wouldn't worry much about it, if the field was a five field.

The spacing of objects becomes very important as the speed increases.

You have to take your camera moves and the speed of your pan into consideration or the objects will bunch up and jitter and jump. The faster the pan moves the more you should elongate the material drawn in the pan. If it is a horizontal pan; elongate them horizontally. If it is a vertical pan, elongate the objects vertically.

Spots are something to be very careful of, I think. Say you have a pan that is full of rocks. It is very dangerous if the pan has any speed to it at all. The background department has to paint them so they look like rocks. If they happen to be approximately the same size as the measured speed of the pan, you would have a swell jitter effect. It would be advisable to elongate the shape of the rocks or do it with a few various sized rocks.

After all, what we're doing with a pan is creating the illusion of movement. We don't want to create any distraction when we draw a

pan, so why not draw the thing so that it gives the feeling of movement rather than catching your eye when you want the eye to go to the character? It can be done by the shapes you put in your drawings. Take a tree for instance. If the pan wasn't moving very fast you would be safe in designing leaves that hang down. As the pan increases in speed it would be well to draw your leaves so that they spread out so that you have the feeling of movement horizontally rather than vertically. Take out all of those rocks and make it simple if it is going fast. Also as I said before -- you're creating the illusion of movement -- why not make them very simple and just put in masses that are designed for the movement.

LAYOUT MECHANICS

With the layout men, I think of three different types of cameras: the five field, six and a half field and multiplane. That is not true. There are two types right now under our production system, but later on there will be three. The six and a half field and multiplane shots are shot on the same camera crane.

The five field material is shot on another crane. I think it is just a question of time when we will have two six and a half field cameras and two additional multiplane cameras, making three different types. That will take the pressure off the multiplane camera for shooting just ordinary six and a half field setups. We wish to have that available before the work comes through on PINOCCHIO.

The Technicolor camera five field crane is mounted above a table that has a circular portion in it equipped with sliding bars and pegs. There are two sets of stationary pegs; one at the top and one at the bottom. Either set of stationary pegs can be used while the bar is in use with its pegs removed, carrying pan on slips at ends of the bar.

Stationary pegs cannot be used if sliding cells are in use or if pegs are to be off center. The moving pegs are part of the bar that carries the background, which makes it impossible to use sliding cells on the same bar to which the background is attached unless they are moving in the same direction and at the same speed.

The camera can be moved up or down to accommodate a range of field sizes from 3¼ field to a 5 field. Also the camera can be moved to East or West or North or South positions within the borders of a 5 field.

South is always the bottom of your field, the right hand side is the east, the left hand side west, and the top is always north.

For fields at an angle the camera table is rotated to the desired degree of tilt, but we, in writing our instructions, say that the camera is, for example, at 25° south to east. Which means that the south side of the field (or bottom of the field) is moved towards the east 25°.

HUBLEY: Suppose you had a 4 field, 90° and you wanted to go 5° beyond that?

CHARLIE: That would be 95°, south to east or south to west, as the case may be. We had one about three weeks ago that was 105°.

MEADOR: Would you reverse or keep on going?

CHARLIE: Keep on going.

MEADOR: Your south goes completely around?

CHARLIE: South is always the bottom of your field.

MEADOR: Suppose you went 95°. The bottom of your field wouldn't be your south would it?

CHARLIE: Yes it would. South is the bottom of your field always.

The degree of angle for a field at an angle can be found by the use of the Rotation Chart. When you have a field at an angle and you wish to find its degree position -- first find the center of the field. Then draw a line vertically through this center and parallel to the east and the west side of the OUTSIDE STATIONARY FIELD. Then draw a vertical line through the SAME CENTER parallel to the east and west sides OF THE FIELD THAT IS TILTED AT AN ANGLE. Then lay the rotation chart over your drawing having the vertical line of this chart, and the center mark also, coincide with the FIRST VERTICAL that you draw. Where the second vertical line hits on the rotation chart, there you will find the degree your field is tilted to.

A field position can be arranged at any angle or any size within the borders

of a 5 field, with this exception: A minimum field size has been fixed as a 3½ field, and we are trying to hold to that. However, if you are trucking in and cutting to another scene or trucking in and dissolving, it is permissable to go to a 2 3/4 field. Do not truck down and hold on a 3 field or a 2 3/4 field. The camera department will not shoot any field under a 3½ field unless it carries an authorized O.K.

The standard cell level on the 5 field crane is 4 cells: The 4½ field on this crane is called the standard field and the maximum field is, of course, a five field. This crane receives the bulk of the work in the studio and the shorts are practically restricted to its use entirely. Only on special occasions can they use the other cameras.

The 6½ field camera is very much the same except that the maximum field size is 6½ field. This gives us a larger area to work in. We can have longer truck ins and truck backs. We can use a smaller field and have a greater moving latitude within the 6½ field area. The standard cell level is 4 cells. At present the

multiplane camera has to be used for 6½ field shots but we are to have standard 6½ field cameras soon.

When using a 6½ field size for a layout and you have another scene that works on this same layout but is a 5 field size or under and the field size falls within the area of the 5 field standard chart, the field size must carry the field markings of the 6½ field chart and instructions must be given that the scene is to be shot on the 6½ field crane but that it can be animated on 5 field paper, inked and painted on 5 field cells.

Do not lay out a 5 field vertical pan for the 5 field crane or a 6½ field vertical pan for the 6½ crane. All vertical pans are to be accomplished by turning the camera at 90° and using the pan horizontally.

The camera itself is capable of giving us some very nice effects. For instance the cross dissolve, affreviated "X-Dis". It is done by cutting the light down with the use of a lense iris in successive steps, from 100% to zero, on the scene going out. Then the film is wound back to the start of the disolve and

the new scene photographed on the same film starting at zero and going up to 100% in the same successive steps, which then gives each frame 100% exposure throughout. This gives the effect of one scene gradually fading out as another scene is gradually fading in.

The "IRIS IN" is a series of black cards or cells with a series of round holes cut out or left clear in the center increasing in size from a very small opening, in uniform steps, until the whole field can be seen. Or the reverse of the procedure is used for the "IRIS OUT." If the iris is to be off center, the point that is to be seen last should be given, so that a set of iris cards or cells can be made as wanted. You can iris out to any section or part of a field.

If a character casts a large or important shadow, and that shadow is to merge with a shadow area on the background, a mask is painted on cell of the shadow area, and masks (animated) will be made for the characters cast shadows. If the shadows are to be 60%

DX, the scene would first be shot without the marks at 40% exposure. Then the film is wound back to the starting point and the masks are used over the scene and it would be shot again at 60% exposure. All the portions of the scene not covered by the masks have then received 100% exposure and the shadow areas have been blocked off for 60% of the exposure. To make a character transparent would simply mean shooting the scene at a certain percentage of exposure with the character on, then rewinding the film and shooting the scene again for the balance of the exposure percentage with the character off.

Diffusion is obtained by shooting through a diffusion disk or lense. This produces an effect of softness all over the scene. Diffusion disks come in different degrees of diffusion, from light diffusion up to heavy diffusion.

"Fading" is the effect of the scene dimming all over and gradually going out to black. It is done by gradually cutting down on the light with the iris or shutter.

Various filters can be used to change the overall color of a scene. Such as a blue filter for moonlight effects or a yellow filter for overall increased lighting effects.

The multiplane camera offers more chances for good effects than others and is at its best when used to provide the illusion of space and depth. It's most effective use is in the long trucking in shots using different levels; in the long truck back shots; in a pan using different levels, and for reflection and distortion scenes.

The multiplane camera can move east, west, north and south, can revolve completely around and can truck up or down. Also the levels can be trucked up or down. The levels have to be at least 12 inches apart to allow for lighting of the levels. Longer trucks can be made on this camera than with the others. In a scene without animation a very large background can be used, which enables a long truck in, say from a 9½ field to a 3½ field.

The use of the levels gives a very real effect of space and distance. In trucking in through top levels, the objects spread away and pass over the objects of the background and gives a fine feeling of dimension.

The level that the action works on is called the contact level, it being the main background level usually.

In laying out a scene for multiplane, we draw our different levels on separate sheets of paper but all the same field size. Tests can be shot on the test camera by inking these on seperate cells, if the scene is a pan and moving the cells through at different speeds. If the top level cell is painted solid black for the test, a better idea can be obtained for the result. Trucking in and out multiplane tests have to be shot on the multiplane crane.

On the multiplane camera the largest field size is a 10 field, without animation.

The largest field size with animation is 6½ field.

There are two levels capable of handling animation.

A scene can have as many as five levels.

Four levels are capable of various pan movements.

GENERAL

OVERLAYS always go on top pegs, unless special instructions are given otherwise.

OVERLAY-UNDERLAYS are used to work under one action and over another.

CUTOUTS AND HELD CELLS are used when some object that is to go into movement is held still. A held cell, besides being easier to make and use than a cutout, matches the line and color of the inked and painted cells better than a cutout does.

UNDERLAY REPEAT SECTIONS are used for economy in making long pans and are also used to cover up a splice since our background paper is now only 48" long.

REGISTRATION MARKS are always indicated in RED.

LAYOUT TRACINGS for the animators are made in BLUE with the registration points indicated in red.

"O" indicates OVERLAY - as O25

"U" indicates UNDERLAY - as U25

"CO" or "X" indicates CUTOUT - as X25 or CO25

"H" indicates HELD CELL - as H25

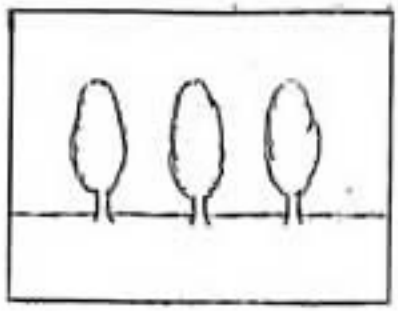
"OU" indicates OVERLAY UNDERLAY - as OU25.

"HDX" indicates HELD DOUBLE EXPOSED MASKS - as HDX25.

FIG-1.

FIG-2.

FIG-3.



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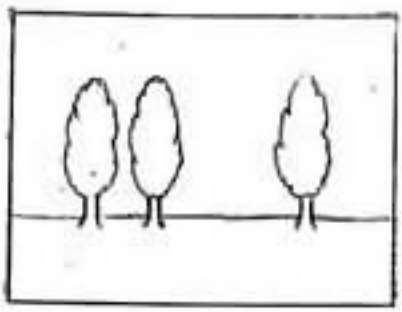

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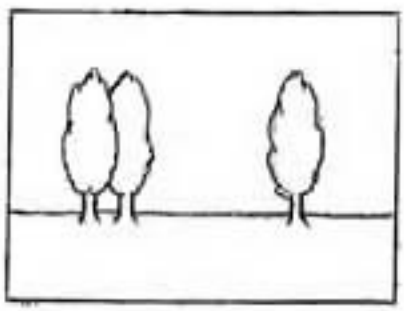

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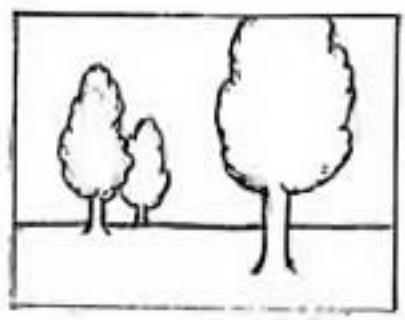

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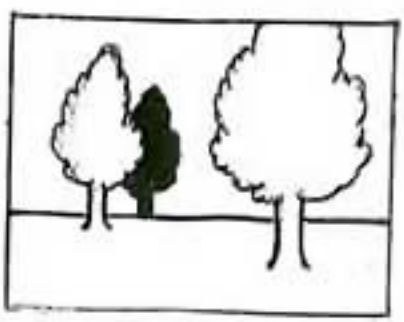


FIG-8.

FIG-9.

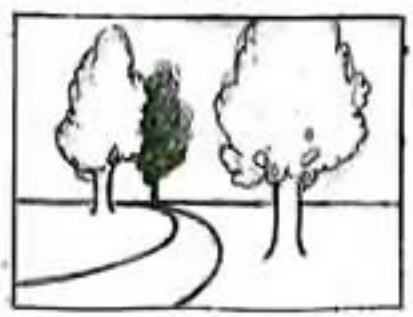


FIG-10.

FIG-12.

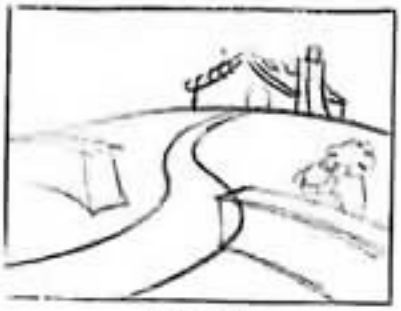
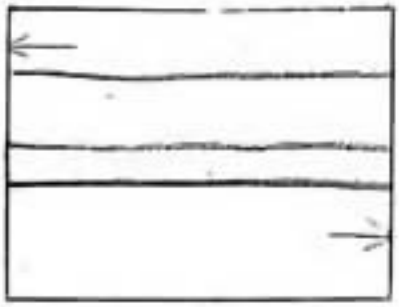


FIG-11.

FIG-13.



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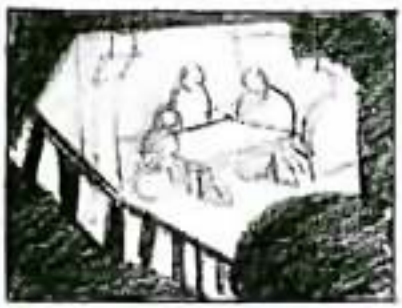

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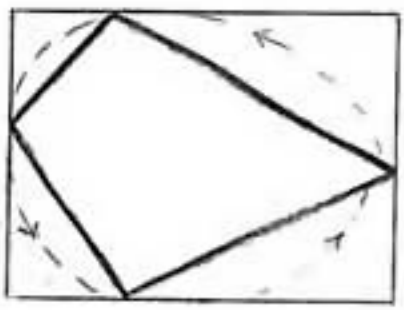

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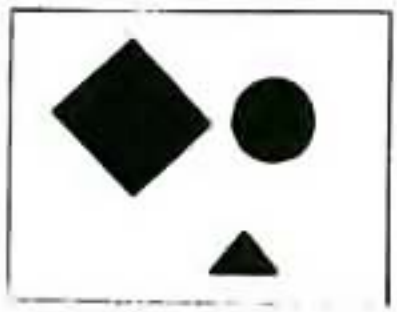

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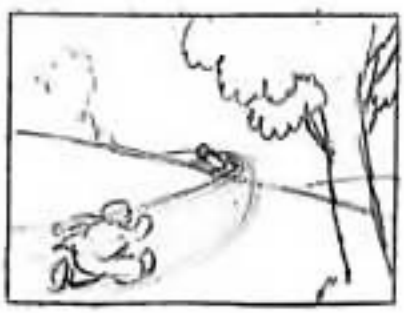
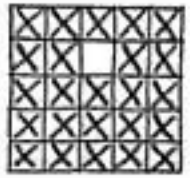


FIG-18.

FIG-19.

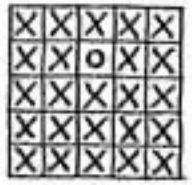
FIG-20.

EXISTENCE



TONE

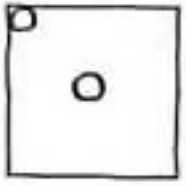
NUMBER



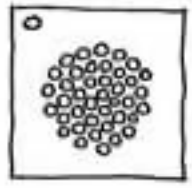
COLOR

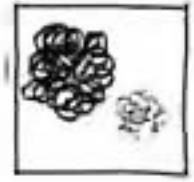
SIZE

EDGE



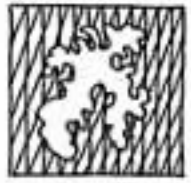
POSITION





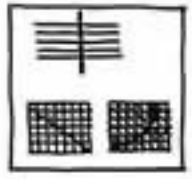
SURFACE AND TEXTURE

SHAPE



DEPTH

LINE



MOTION

FIG 1

FIG-22.

FIG-23.

FIG-24.

STAGING

by

Ken O'Connor

GENERAL AND THE PAST

Mechanics of staging extend from national war maneuvers to the arrangement of potatoes in a market display. However, despite their universal character, mechanics are always secondary in importance to the creative idea that calls them into being. Our staging methods of today are merely something to grow from and of course not to be accepted as the ultimate.

In discussions on staging and settings one often has to go back to the start of things in order to clarify one's philosophy. To this end the accompanying illustrations on Plates I and IA may serve as a condensed historical review of the way in which plays have been staged. These plates deal with settings rather than staging action, which will come a little later. Even though we have grown

PLATE I

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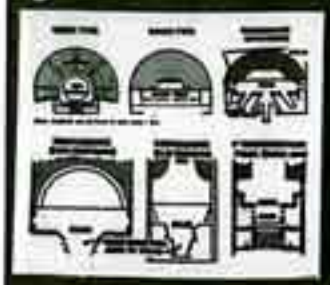

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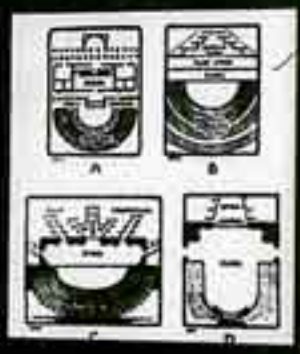

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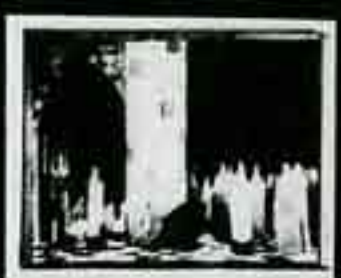

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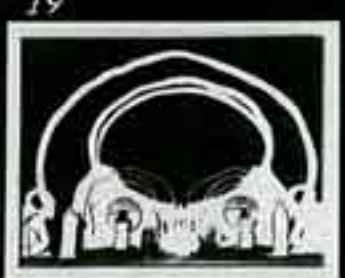

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PLATE 1-A

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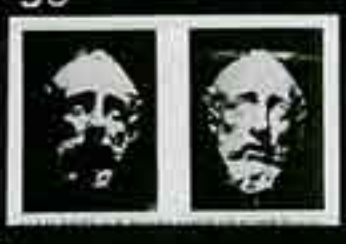

PLATE II

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in some measure beyond and away from the legitimate stage, our medium, after all, follows centuries of theatrical development.

PLATE 1 (1) "Theatre Plans from Greek to Modern"

Historical staging arrangements -- the Greeks held their plays, usually religious, in a dancing circle. The theatre was hollowed out of a hillside and there was a little temple close by. This was later moved down to the dancing circle and used by the actors as a dressing room. It was called a 'skene' and eventually became the first considered background.

The Romans chopped off part of the circle and introduced a straight, raised stage.

During the Renaissance, the theatre moved indoors, the circle became a rectangle and attempts were made to create an illusion of perspective.

Development through Elizabethan and later times led to the introduction of

the modern proscenium arch type with movable wings.

PLATE 1 (2) "Greek"

From a vase drawing -- This vase shows one of the earliest staging forms. A simple open air platform to which led a short set of steps.

PLATE 1 (3) "Greek"

Theatre showing temple and hollowed hill. No raised stage.

PLATE 1 (4) "Greek-Roman"

Showing temple moved down hill to edge of dancing circle, -- this shows the beginning of a conscious attempt to achieve a considered background behind the characters. It is an open type, of architectural character with minimum scenery.

PLATE 1 (5) Roman

Showing orchestra circle halved and joined to seating space. All acting was on the straight, raised stage. For scenery they frequently used two "periacti" or

triangular prism forms (Not shown). On each face was painted a scenic element, usually one of these symbolized comedy, one tragedy, and one was for specific moods and places. The periacti could be revolved and if there was, for instance, a tree painted on the side turned toward the seats the audience was supposed to imagine the scene was in a forest. This system limited scene changes to three a performance. Frequently the back stage wall was painted to represent an architectural construction.

PLATE 1 (6 and 7) "Dark Ages"

Plays were shown in altar areas and porches of cathedrals as shown; also by strolling players on market place platforms and wagons. Multiple stages were employed whereon could be seen at one time all the scenes to be used during a performance, probably an indirect inspiration for our modern montage. The theatre gradually moved indoors.

PLATE 1 (8) "Renaissance"

Plans showing evolution. Starting from private ballrooms there evolved the rectangular stage and auditorium. This was a neo-classic revival in 15th century Italy. The illustration shows how perspective effects were attempted by running sections of the stage back. This trick was strengthened by perspective scene painting.

PLATE 1 (9) "English"

Plans showing further evolution through the Elizabethan period (1533 to 1603). These include Shakespeare's time, when platforms in inns were used with title-cards for scenery. Dandies had seats on fore stage. These seats later developed into boxes.

Function of Setting

One is struck by the fact that in some of these great periods there was a minimum of scenery used. If the audiences were satisfied by the actors' work, almost

unsupported by setting, the question comes up as to how we justify aiding a scenic element that might detract from the acting art. This in turn leads to the question of how a play lives. It does so by touching the passions, prejudices, ideals, ambitions, hopes, memories, ideas and beliefs (even though discredited) of the audience. The conclusion therefore appears to be that a setting is justified insofar as it enhances the play's ability to do these things.

Audience Participation

The setting is always secondary to the creative idea of the play. A bad play is not usually successful because it has good sets and a good play will generally succeed in spite of poor sets. This is largely because the audience has subconsciously said "let's pretend" even before they enter the theatre. They usually have a holiday spirit and in that frame of mind are willing to accept even mediocre conventions for non-existent things. An audience goes to participate in a play and not merely as

spectators. This is valuable to remember and has led to many attempts to make the audience feel they were part of the play.

For instance the Greeks sent actors through their audience on the way to and from the dancing circle, creating a feeling that the audience was part of the show. Max Reinhardt has attempted the same thing by sending droves of actors through the aisles in a great circus-like theatre he built in Europe. Again there have been instances of splitting the stage in two, with the audience between two groups of actors. Bel Geddes had the same thing in mind when he converted his theatre into the semblance of a cathedral interior for performance of "The Miracle".

Motion pictures have tried solutions of the problem. For instance, in "Dr. Jekyll and Mr. Hyde" the camera took the place of an actor and as it moved down the road people took off their hats to it and wished it "Good morning". The audience felt that it was the actor walking down the road. Again in "The Leather

Pushers" a boxer was knocked partly out-- the next shot was taken from his viewpoint and as the camera was made to waver about, the audience experienced some of the boxer's optical sensations. In the picture "Beethoven" the problem was tackled from the sound angle. A violin would be playing -- but as Beethoven appeared its sound would die away. Then as Beethoven walked away the sound increased, thereby figuratively putting the audience in Beethoven's ear and making it conscious of his deafness. In bringing the audience into intimate participation one of the great advantages lies in the close-up with its clear display of subtle expressions and small but important details.

STAGE AND SCREEN

One value of a stage and screen comparison is to show there is danger in getting too many ideas from the stage. It also brings out some of our special advantages. For instance, at a stage play the audience is fixed, getting a constant medium or long

shot according to where its members are sitting. On the other hand, in a motion picture the spectator's eye is free to move instantly from long-shot to close-up according to the director's will. Then, to a certain extent, the stage is bound to real space and time. An actor walking across a stage must take the normal time to cover such a distance. Against this a movie director has the advantage of dealing with celluloid strips, which are much more subject to his will, enabling him to cut out useless intervals of space and time, and thus speed up the tempo of a piece of business. For a simple example, a man falls off a building. We show the top of the building with the man falling out of the field. Immediately we cut to the ground showing him land. The intermediate time and space occupied by his fall are eliminated and interest maintained at a higher pitch.

Another example of condensing time and space quoted by Pudovkin, the Russian director, was a series of five cuts:

1. A man walks from left to right.
2. A woman walks right to left.
3. They meet, shake hands, and the man points off stage.
4. Cut to what he pointed at, a long shot of a building with a flight of steps.
5. A close-up shows the couple entering the building.

The cuts worked smoothly on the screen. However, it was pointed out that the director had taken a shot of the man walking left to right in one part of a city; the woman was filmed in another part of the city; they met and shook hands in an entirely unrelated section of town; the long shot of the building was taken from a film of the United States White House, and the final close-up was shot on the stairs of a memorial building in Moscow.

This was just a stunt, but by making a distance of thousands of miles seem like a few yards on the screen, he brought out strongly the possibility of condensing time and space by cutting.

One designs for more static tableaux on the stage where it is not as quick or easy to change scenery constantly as on the screen.

STAGE STYLES

Illustrations on Plate 1 cover most of the important stage design styles. We can use most of them, while others depict things we are trying to avoid.

PLATE 1 (10) "Italian"

Running actors down stairs into the auditorium, is an example showing effort to get audience to feel they were participating.

PLATE 1 (11) "Extreme Realism"

This interior of a street car represents a mood we have not yet gone in for and which seems outside our scope. I read of a Jesuit play produced in Tournai in 1549. This play had a simple title, "The Triumph of Mardocheus, the History of Esther and the Death of Holofernes".

The stage was set up in a cemetery and a condemned criminal was selected for a leading role. He was very flattered by having been given a part and in the last act unsuspectingly allowed them to chop off his head. It hardly seems worth while trying to go further with realism.

PLATE 1 (12) "Extreme Realism"

This David Belasco setting is extremely cluttered up with casual details and the characters become lost. It is an example of the sort of thing we are striving to stay away from in our layouts. We can create the same atmosphere without all that detail.

PLATE 1 (13) "Extreme Realism"

This type of photographic naturalism is another example of something to steer clear of in our cartoon medium.

PLATE 1 (14) "Simplified Realism"

This one, on the other hand, is a well composed set by Lee Simonson. It represents one of the two main stage design

trends of this century. The other trend, followed by a minority of 20th century designers, is toward non-realistic sets and includes dispensing with the proscenium frame. This illustration represents a style we are following to a certain extent. The blank area gives sufficient feeling of atmospheric space without laboring over perspective.

PLATE 1 (15) "Simplified Realism"

This symmetrically designed interior by Joseph Urban illustrates how a simplified set can convey a monumental feeling with a great degree of richness -- in this case by textures.

PLATE 1 (16) "Suggestion"

Stage set for the interior of a waiting room. This combination of blank space with a few naturalistic props is a dramatic way of indicating atmosphere without cluttering the scene and leaves something to the audience's imagination -- frequently a good thing to do.

PLATE 1 (14 and 18) "Literal vs. Suggestive"

Two solutions for one problem. The first designed during the 19th century and the second in 1910. The first would tend to overpower the actors by its gigantic scale while the second, by means of restrained and decorative suggestion, achieves dramatic force and at the same time provides the actors with a good space in which to work.

PLATE 1 (19) "Stylization"

Shows use of unnatural shapes and exaggeration of a kind we can use effectively in our more fantastic pictures.

PLATE 1 (20) "Stylization"

A naive approach which we have not yet tried. It has a childlike charm that would fit into our fairy stories very well. It would blend well with the flat handling of our characters.

PLATE 1 (21) "Sculptural Fantasy"

A fanciful, architectural handling of rock forms designed for displaying every

scene in"Faust" by means of light changes on a revolving stage.

PLATE 1 (22) "Formalism"

This is aimed mainly at providing a non-representative framework for the actors to perform in. It is called a space stage.

PLATE 1 (23) "Anti-Realistic"

A set by Appia who greatly influenced stage design. Its almost geometrical forms suggest rocks and create a strong mood. It also brings out effective silhouettes, a treatment into which we could delve deeper than we have.

PLATE 1 (24) "Anti-Realistic"

An abstract set for "Hamlet" by Gordon Craig. Here the attempt is to express the actor's mental state, rather than picture a real place. Perhaps dangerous material for cartoons, but at least it is a stimulating approach.

PLATE 1A (25) "Anti-Realistic"

Another semi-abstract set by Craig. It reflects some of the simplified architectural feeling we see in SORCERER'S APPRENTICE and gains power by not being literal as to detail.

PLATE 1A (26) "Post-War Expressionism"

A set from the motion picture "The Cabinet of Dr. Caligari". By use of off perspective this has somewhat tricky geometric basis. It was evolved from a painting done by a group of German artists. The stage has not been too successful in applying this approach. We are dealing in the painting medium so perhaps we might find it more adaptable to certain cartoon subjects.

PLATE 1A (27) "Extreme Functionalism"

This extreme anti-decorative style is called constructivism. No apparent effort is made to soften ugliness, the back stage ropes and pulleys are left visible.

It works, but lacks the "beauty that is only skin deep" because the skin is left off. I don't think we can learn very much from it, except not to think along those lines, but it is included for historical interest.

In a sketchy way this brings us up to date in design trends.

CARICATURE IN CARTOON ELEMENTS

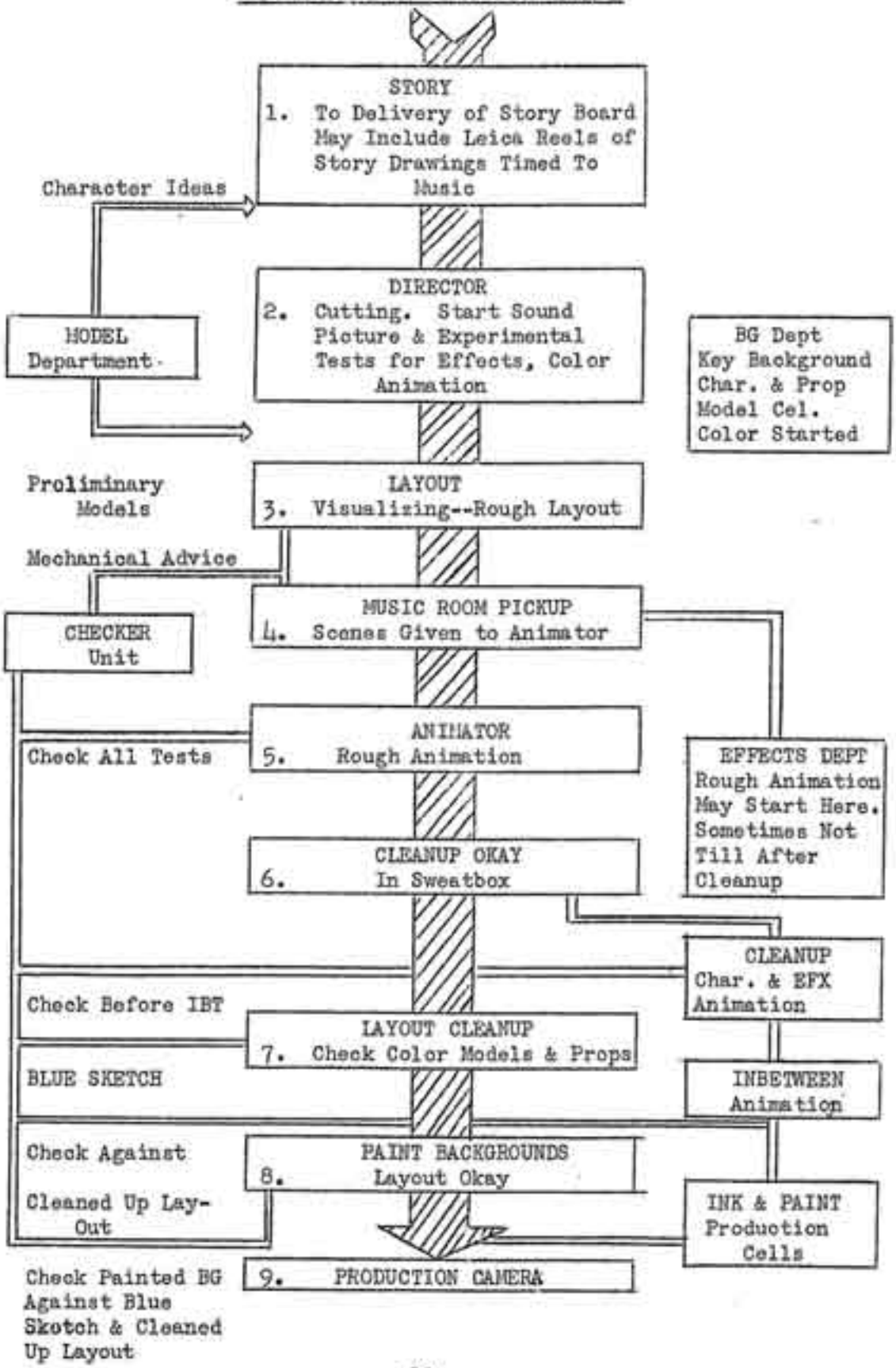
Considering animated cartoons we find the elements are already caricatured. This does not mean necessarily that they are always made funny but rather that selection, stylization and emphasis are used.

For instance, in the acting element an animator goes beyond human pantomime in the matter of stretches and squashes, as well as working in formalized tempos. The element of dialogue is subjected to selection and simplification and is frequently delivered in a stylized way. Music and sound effects are emphasized to raise emotions above the normal level by what might be called caricatured accents. Slide whistles and drum rolls

are used where the real sound effects heard would be less effective. Cartoon settings can best amplify the picture mood by conforming to those rules which govern the other elements. This automatically rules photographic realism out of our stylized fantasies. The caricature approach in its application to layout has resulted, among other things, in forcing perspective, scale contrasts and in thickening the handling of props. The latter is a result of working with characters that have a somewhat fat, spherical basis. There are few things that cannot be thickened with good cartoon effect--even modern props. Details have also been simplified and we emphasize essentials such as legibility and mood. Characters are simplified because we couldn't animate every stitch of their clothing.

Caricature has a limited application to our color. The public has a number of stereotyped concepts of color -- such as the idea that red is for danger and green for safety. These are crude examples but the matter also goes into subtleties. The mind of the audience is usually of the action and story, so color works generally subconsciously like the music track, but even so it can have a powerful effect. For instance, if a king appears in a purple robe, the audience will instinctively accept his regal status more readily than if he is garbed in a dull gray. Bearing in mind these preconceived, and perhaps at times inartistic, ideas that the audience brings with it we can strengthen a cartoon's effect by considered exaggeration.

WORKING SEQUENCE



While the layout department does not generally enter actively into the picture until the story board delivery (1) to the director, the idea of a previous contact with the picture cannot be too strongly stressed.

At (2) the main creative visualizing of layout begins and it is completed when the director gives scenes to the animator at music room pickup time (4). At this time duplicates of the rough backgrounds, overlays etc., along with action sketches, effects indications and perspective diagrams are delivered to the animator.

It is important that layout mechanics etc., be well worked out before pickup time as the pictorial material is next distributed to various departments and does not usually come together fully again until after cleanup time.

Between 4 and 6 there is a lull while animation is done, during which time layouts, which are not expected to change, may be

rendered, or the layout man may have to do creative work on his next sequence or short. 6 is the signal for completing layout clean-up, checking mechanics, color models, props, records, etc.

This routing is not ironclad as each picture presents new problems and possibilities. Sometimes a layout man is able to start in the story department and follow through to completion of layout. Sometimes animators are in a position to discuss scenes with the director and layout man prior to pickup time. This is a considerable advantage in that it saves the layout man having to make changes at pickup time due to such things as character sizes or cutting being impractical from the animator's point of view.

LAYOUT FUNCTIONS AND CHECK SHEET

A layout man's function is to collaborate with the director in staging the business clearly and interestingly. In most cases

the layout man is not required to accept blindly all the director's ideas, but rather to question them in an attempt to supplement and interpret them pictorially.

The order in which one should think of layout elements is roughly the same for each picture. To save re-thinking this sequence out each time, the following chart lists the various considerations in order.

LAYOUT THOUGHT SEQUENCE

CREATIVE

STORY

Mood:
- Romantic
- Dramatic
- Cute
- Mysterious
- Fantasy

Locale:

Time:
- Of day
- Season
- Period

Cutting:
- Preceding Scenes
- Following Scenes
- Personality or Pictorial Scene
- Character size and Length of Shot

COMPOSITION

Screen Directions:
- Floor Plan
- Footage of Scene
- Speed of Scene

LAYOUT THOUGHT SEQUENCE - Cont.

CREATIVE (Cont)

COMPOSITION (Cont)

Angle:
- Look Up
- Down
- Oblique
- Horizon
- Perspective -- Forced or not?
- Center of interest

Humor:
- Prop selection
- Proportions

Legibility:
- Character Clearance
- Simplicity
- Placing of Interest
- Portrait Principles
- Off-center Field, Safety
- Thickness of Details
- Check Sizes with Animator

Combine with Other Scenes?

Miscellaneous (check):
- Line Design
- Tone Design -- Vignetts
- Light Effect -- Direction
- Shadows DX or Transparent
- Depth-Scale Contrast, Perspective, Overlap
- Parallds

Design Principles:
- Balance
- Asymmetry
- Symmetry
- Stability
- Subordination
- Contrast
- Rhythm
- Repetition
- Variety
- Radiation
- Graduation
- Tangential Growth

MECHANICS

Check:
- Dupe B. G. O. L. etc.
- Identification Tabs
- Fields, Trucks Pan Moves
- Repeats Indicated
- Horizon Indicated
- Props
- OL, UL, CO (Speed, Size, Shape, Interest, Tone)
- Match to other scenes
- Registration -- Shadows, Props and Characters
- Unit Stamps
- Make Test?

Records:
- Call Unit Checker
- Mark Status Chart and Book
- Check B.G. with Animator or Assistant
- Change Memos
- Check Blue Sketch at Cleanup

Models:
- Color - Weight - Legibility
- Relation to B.G.
- Used in what scenes
- Consistent Detail

APPROACH AND LAYOUT CHART BREAKDOWN

In breaking down these items we start with story and approach. It is vital to get an early understanding of the director's conception as to mood, locale, etc.

In creative layout live basic ideas are vitally important. When I was in art school one teacher illustrated this effectively. He had us poise our pencils, gave us a word, such as "storm", and then allowed us one minute in which to illustrate the word. Naturally we got only a simplified scratch or two down, but he pointed out that what we had was the live germ of our personal conception of a storm and it was capable of development into a good picture. That was a valuable exercise in what might be called the pre-logical conception. We achieved a lively result because we were keyed up by the prospect of having to finish in one minute and were thus concerned only with the main idea as seen in our mind's eye. This sort of stimulated approach is important to creative layout. If one can see a story situation from the actors' point of view, as a real occurrence and not as a drawing or painting, one can become excited about it and develop better basic idea germs.

The value of this approach becomes apparent when it is considered that the audience, too, will later put themselves in the actor's place -- and judge the cartoon accordingly. The next important thing is just as vital and equally difficult -- the effort to retain the first bright conception intact throughout the inevitable compromises that follow in production.

In addition to forming one's first broad conception, it is also valuable to dissect the story mentally and think around each element separately (much as a writer does) in search of pictorial ideas before bearing down on a specific layout.

Apathy at the start of a creative effort is almost always fatal, and I have observed many attempts to save a sloppily conceived design by careful rendering of details at clean-up time. Such polishing hardly ever saves a basically poor conception. The trouble is sometimes brought about by a layout man misusing experience. If he

is tired or hurried there is a temptation to throw a time honored formula into the balance in place of thought -- just to make the layout work. The final product is bound to look uninspired.

Following the basic idea comes the matter of using reference. I find a good method is to collect all available pictorial data and saturate oneself in the atmosphere of the period and place to be portrayed. Then, before drawing, put the reference away and let the imagination loose. In this way the mind generally retains a better feeling than can be obtained by mere copying. Of course, one cannot remember all minor characteristics of a period, so in the final stages we may legitimately have recourse again to refer to the data on matters of exact detail.

When boards come from the story department, they have a continuous flow of action on individual sketches, usually without

much thought as to what scenes will work on the same background or whether there is any background at all. Staging the business first involves cutting from the layout man's point of view. This consists primarily of editing -- that is, figuring where to finish one scene and start another. It is then decided which type of shot is called for, whether it is to be long, medium, or closeup as well as the type of camera moves and angle to shoot from to retain a continuity of feeling and screen directions. A number of lesser things are considered during cutting such as light direction throughout a sequence.

Our editing and staging methods differ from those of certain live action studios. In those studios it is the practice to shoot scenes first in long shot form, then re-shoot in medium shot and finally re-shoot in close-up form. This makes for safety by providing three choices for the staging of each scene in cutting. Since such a method would be prohibitive in cartoons, we endeavor to work

out our editing and staging at the start of production in as complete a form as possible. Even so, of course, there are unavoidable cutting and staging changes later in each of our pictures.

Preliminary cutting is shared by the layout man and director as it depends on both acting business and pictorial considerations.

The proportion of cutting done by each man is variable, depending upon personal ability, inclination and the character of the picture. This preliminary work is frequently done in miniature form which is most useful in forming a broad view of the picture or sequence. The small drawings keep one from the temptation of fiddling with small details in the work too soon. If I were a background painter I would endeavor to apply the same method to tone and color.

By adopting multiple spectators viewpoints, cutting can bring about complete apprehension of a subject. An example

mentioned by Pudovkin is the picturing of a parade. The first shot might be taken from a roof to show the general appearance of the march. The second shot from the sidewalk, among the spectators. The third from the road showing close-ups of the marchers. This sequence, of course, would result in a more complete understanding than would be gained by a camera or person stationed at any one of the points mentioned.

The same multiple viewpoint idea has been attempted in painting. Plate 5 (J-K) after a design by Picasso, shows general and sectional aspects of a bottle simultaneously from different spectator points. The same thought is evident in the table by Cezanne, Plate 3 (S).

Prior to actual cutting, it is important that the layout man try to foresee the probable pacing of a picture. This is a matter of speeding and slowing the action appropriately in relation to the story. While mainly a consideration for the director, pacing has

a direct bearing on layout, as the speed of a sequence determines in varying degrees the speed of cuts and pans and the footage of individual scenes. These considerations in turn indicate the practical amount and size of pictorial details which the audience will have time to see. It is, therefore, evident that a thorough feeling for pacing will eliminate the inclusion of superfluous elements in fast sections and insure adequate working out of designs that are to be held before an audience for some time.

This time element is probably the greatest distinction between our work and that of most other graphic arts. It necessitates a basically different approach from that used, for instance, in easel pictures where the spectator sets his own time for studying a picture. It forces us to realize our designs are useful only as they work during the picture's performance. These statements seem obvious, but the situation has profound implications and seems to me to be profoundly difficult to understand for some artists coming from other fields.

Early in the work of cutting we sometimes try to formulate a floor plan of the action related to the desired screen directions in order to visualize clearly the scene of action. There is a danger in plans, however. For instance, as far as screen directions are concerned the audience usually feels that when a character leaves an object by moving to camera left he should return to that object by moving to camera right.

Taking intervening scenes intp account, it may be possible to prove by plan that the character should return to the object by moving left. However, this is likely to look wrong on the screen, so we would in all probability violate the plan in order to avoid confusing the audience's sense of direction.

Incidentally, while we have an almost perfect formula for cutting shorts, now that we have features, I think we are going

to see our conception of cutting changed to some extent. For instance, certain sequences will slow down more than has been possible with shorts. This should make possible more medium and long shots. With the additional time in features, our concepts as to legibility may not have to be quite so extreme.

In this direction we can learn much from such live action picture men as director Frank Capra, who frequently cuts to secondary characters while the star is delivering dialogue, runs extras in front of central characters, and successfully uses similar innovations which we have avoided in past shorts due to the demand for high legibility.

INDIVIDUAL SCENE

Following our first general cutting comes the composition of the individual scene.

This is governed not only by normal design principles but also by such matters as speed of action and footage involved and relationship to preceding and following scenes.

Camera Angles

Selection of the exact camera angle must have a logical basis and we avoid sensational shots except where they amplify the dramatic effect sought.

Angles should be chosen to exclude the unnecessary and accent the necessary.

It is frequently useful to consider how a scene might look from one of the actor's viewpoints.

The Looking Up Shot

Psychologically, the looking up shots helps to give an exhalted feeling. If you were shooting the Statue of Liberty you would probably make an up-shot of it. The up-shot gives height and also increases a feeling of terror or danger. If there were a Frankenstein monster approaching we would probably select a low angle and shoot up to make it seem more dominant and fearful. Related to the looking up shot, is the low horizon shot where we are looking up at the things we usually look down on or straight at.

This gives a feeling of intimacy with small characters. If our story concerns a mouse it is effective to shoot from mouse level.

The Looking Down Shot

The looking down shot also gives height and is useful in dealing with a character you want to show as contemptible. An example of psychologically using upshots and downshots occurred in a series of two-shots in "Jezebel", as commented on by Charlie Phillipi. The scenes concerned a virtuous and a not so virtuous woman. The characters were on a staircase. Upshots were used when shooting toward the virtuous woman and downshots when featuring the other character. Another downshot advantage is to clarify a chase or dance by showing almost a plan of the action. See Plate 2 (64) and Plate 5 (L).

The Oblique Angle.

This is a combination of looking down and at an angle or up and at an angle. We use it for a feeling of violent perspective,

instability, for variety in a montage sequence, or to get over the feeling of excitement or agitation, It often involves using angle fields. In FERDINAND when they were showing the five men in funny hats reacting to Ferdinand's antics they conceived them first with regular square fields, cutting from one character to the next. Then finally they turned the camera on a little angle, first in one direction then in another, with each successive cut and it gave a good feeling of variety to things that were basically the same. The oblique angle forces perspective by vanishing verticals, either down or up.

Legibility

Related to the angle is the vital consideration of ligibility. Some directors rightly demand almost a blank backdrop behind characters in certain scenes and would not tolerate a handling such as in the Belasco setting, Plate 1 (12½. Plate 1A (31 and 32) is a reminder, that if we can pick out the essential lines of the characters in held positions, we

can complement them by layout and background handling.

Path of Action

Legibility involves consideration of the path of action. This creates a definite abstract design of its own Plate 1A (30) which can be enhanced by layout composition. The path of action creates a pattern even outside the screen as when a character throws an object out of the top of the field and the object falls into the picture again after describing an imaginary arc in space above the screen.

CARTOON PERSPECTIVE

Due to movement of the camera, characters and backgrounds, cartoon perspective is almost a unique art and often involves changing both vanishing points and horizons on a single drawing. See Plate 3 (P,Q,R,T.)

Plate 3 (a and b)

For a quiet background we can imitate the telephoto effect in a closeup. Perspectively

this means separating our vanishing points widely as would result from a distant point.

Plate 3 (c)

For more dramatic punch we can imitate the wide angle lens closeup by pulling the vanishing points close together.

Plate 3 (e)

In closeups we can infer height or depth by forcing the vanish.

Plate 3 (f and g)

Depth by line and tone. We sometimes reverse the scheme shown in "g" with good results.

Plate 3 (h)

When vanishing points are off the drawing board, we can find the angle vanishing parallel by constructing parallel triangles as shown between vanishing parallels "A" and "B".

Plate 3 (i)

When vanishing points are off the drawing board we can find the horizon given vanishing horizontals"A"and"B." Construct a rectangle on"A"and"B." Draw line "C" at any angle. At intersection of "C" with "A", drop vertical "D". From lower corner of rectangle draw

line "E" through intersection of "D" and "B". "E" meets line "C" at horizon.

Plate 3 (j)

Construction for casting shadows from artificial light source. Light spots on walls, floor and ceiling are areas where illumination will be strongest.

Plate 3 (k)

Diagrams a recurring layout trouble. We lose depth by drawing solids that just touch tangentially -- at least from a line point of view. The solution seems obvious, but is frequently missed.

Plate 3 (p)

Diagrams a common perspective cheat. According to perspective shown, the horizon should be above the top field, but was lowered to achieve a feeling of height.

Plate 3 (q)

A method of cheating the vanish of floor boards on a long pan where one vanishing point alone would result in great distortion at either end.

Plate 3 (r)

Another solution for the same problem when the center section is fairly fast.

Plate 3 (t)

A common trick that looks bad on a layout but works on the screen.

Plate 5 (n)

Distortion resulting from vanishing point too close in. Solution is to pull vanishing point further off stage.

Plate 5 (m)

In laying out a path of action consider the feeling of force necessary. 1 to 4 diagrams increasing degrees of violence involving perspective.

Plate 5 (p)

The above is related to the angle and degree of force expressed in the main lines of the background which are shown here in order of intensity. Arrows denote direction of action.

Off Perspective

Forced, or off perspective, is a subject we have not yet fully exploited.

Plate 1A (33) shows how the exaggeration of this window by Anton Grot heightens one's sense of looking up and gives a feeling of excitement. I think we have an advantage in this direction over live action studios. In most cases they used to design sets to be shot from just one angle. That enabled them to figure strange perspective where floors slanted up and doors were off-scale, etc., to heighten a mood. But now the director often decides to shoot from a number of different angles on one set. Therefore they have to steer clear of too much off perspective. Otherwise, as soon as they shoot from a point of view for which the set was not designed, it begins to look wrong rather than dramatic. Actually, however, we can adjust those things by drawing a background and painting it.

Cartoon scenes are much more flexible and perspective can be cheated from scene to scene with comparative ease.

Depth is a prime objective in layout. Aside from scale contrasts and perspective rules, we can achieve depth by introducing overlays moving at a different speed from that of the background or contract level.

Scale contrast is important to us for achieving depth and also for indicating character size. A classic example of mishandling this subject occurred in a live action picture of midgets. The sets and furniture were scaled down to the dwarfs with the result that all sense of the small characters' size was lost.

Framing

The character is usually the center of interest except in a pictorial scene. In framing the character for a specific scene we have to get a sufficient difference in the size of the character relative to the size in the preceding scene to make a cut. I noticed a failure to do that in a feature picture. They had a shot down a hall toward a doorway with a character standing in the center of the field. They cut

further down the hall to an identical setup with another character the same size and also in the same field position. The audience got the feeling that the first character had turned into the second. We also have to consider the size of the character in actual fact. If it is small we try to keep it small on the screen and vice versa.

The center of interest must be watched from scene to scene or it is liable to jump disturbingly all over the screen. Sometimes re-framing will correct trouble in this direction.

Apropos of framing, Plate 1A-29 shows an interesting space division which is calculated to create a feeling of danger by including a big void below the figure.

Framing is largely determined by the layout man at rough layout time, when tentative fields are selected. These are usually modified later by animation requirements. They should always be laid out to include an adequate safety margin within the limits of

the 5 or 6½ field charts as the action frequently necessitates later enlargement on two or more sides of the field. Plate 3 - n.

As some animators have a strong tendency to go large on character size, constant checking with field masks is highly advisable. After the scene has been handed out, changes as a result of the animator's concepts and original fields are apt to make a poor composition.

Plate 5 (f,g,h,i) indicates our use of old portrait principles in framing a character to make him appear normal size -- tall, short, or small. Notice that we leave more space on the side toward which he is looking. If he were to gesture to the right, we might lay out the scene with the field and character to the left of center to provide an additional safety margin. This applies also to groups of characters.

Emphasis

When it comes to emphasizing the center of interest we have a number of methods such as vignetting or darkening of values towards the field borders to simulate a spot light effect -- either by painting, DX masks, or air-brushed cells. Then we can place emphasis by line, texture and tone contrasts as in Plate 1A (34 & 35). This involves the study of what Japanese artists call Notan, that is the dark and light pattern of local colors as distinct from the chiaroscuro of light and shade. Plate 1A (37,38,39). Emphasis by light is important. Frequently under-lighting or top-lighting can focus attention strongly.

On the subject of emphasis Charlie Philippi made a very good point when he said that whereas our eye goes to an active figure when surrounded by static figures, the reverse is also true, and further, that this applies to color -- the eye going on the one hand to a spot of brilliant color if that spot is surrounded by gray, and on the other hand to a spot of gray if the spot is surrounded completely by much brilliant color. This principle is far

reaching in effect as it relates to designs of lines, shapes, solids, voids, etc.

Emphasis can be helped by a change of the apparent shape of our screen. This is accomplished by using either very dark background areas or overlays as shown in Plate 5 (a,b,c,d,e) This has been done in live action by Sergie Eisenstein who actually masked off areas of the frame to achieve a more vertical or other appearance than that provided by the standard camera field rectangle. Such masking can be given a symbolic significance when the shape enclosed indicates a keyhole for example. In introducing overlays it is advisable not to allow them to parallel the frameborders when they are in close proximity to the edge of the field as this has a very flattening effect on the picture. Plate 3 .

Among his tools of trade the layout man has a vocabulary of types of shots. Long shots are mainly used for introductory purposes to establish atmosphere or to show a light effect or light change such as sunset to night. Long shots of course, occur on pullback when leaving a scene and are used

also to emphasize aloneness. Plate 1A (28) was designed for ALICE IN WONDERLAND by Usher to create the feeling that Alice was alone. With this amount of space around the little figure you get the feeling that there is no one near her. This might be compared with the scene in the motion picture where the scene was shot in closeup.

Then there is the medium shot for single figures or small group shots, for full figure pantomime and reaction to dialogue.

Closeups are used for detail, facial expression and dialogue. They are good for eliminating unwanted material. Normally we cut to a one-shot of a character delivering dialogue, then cut to another character reacting to the words. However it is sometimes good to remember that two-shots maintain a feeling of contact between two characters engaged in dialogue.

Finally there is the montage, which can indicate the passage of time and deals with compound ideas or the evolution of an idea. Montage helps cutting by providing a carry over of ideas. For instance in a silent picture there was a shot of an accordion player. His image was continued faintly through several following scenes of people in the vicinity, offectively inferring the continuous music. Again, in "Winterset", a gangster was speaking of the hero. They cut to the hero talking of the gangster whose face was still carried faintly for some time, gradually fading out. This slow montage dissolve formed a very smooth hookup of ideas.

Stills

All these types of shots can occur on stills or pans. Plate 4 (a to j) shows some normal camera moves on still fields. These can occur on either 5 field or 6½ field setups and direction of camera moves can be reversed. "A" represents the camera at 90°

with truck in or out, useful for a high stretch on a character. "B" a normal center truck generally used on long shots for introducing or leaving a scene, setting atmosphere. "C" a small field closeup of a character moving in a restricted way so we can keep within a 5 or 6½ field. "D" the same thing with a truck. "E" small field for introducing adjacent detail or something like a character jumping up in the air. "F" the same thing with a pull-back. "G" diagonal move. "H" the same with a truck. "I" off center truck. "J" diagonal field, among other things useful for montage work or for variety in a series of otherwise similar shots. A psychological use of diagonal fields was effectively made in the courtroom sequence in "Winterset". The trial was a miscarriage of justice. The scenes were shot with the camera field slightly diagonal, making the audience aware of the crooked proceedings by inducing a subconscious feeling that something was wrong. The camera moves shown can occur in a curved path as well as in the straight directions shown.

On all pans particular attention as to clarity and design should be given to hold positions where the pan stops for a considerable time. These holds can be picked out from the blue sketch. Plate 4 shows some usual pans. "K" is a horizontal pan where we usually work for an S movement in elements because this flows through effectively with a minimum of jittering. Perhaps the main mechanical consideration with all pans is to avoid the use of straight lines which are at right angles to the direction of the movement of the movement of the field. For example a vertical picket fence moving through on a horizontal pan is almost certain to jitter. Furthermore if the distance from the side of a picket to the same side of the next picket equals the distance the pan is moved each frame, each picket will replace the preceding one and the fence will appear to remain stationery. "M" is a horizontal sky pan with field at 90° and the movement is vertical relative to the screen. Flat

clouds are apt to behave like the pickets so we work for an S curve or part of an S curve. "L" is a diagonal pan, the shaded area of which could be a cutout, which, on reaching the end of the pan could be moved with the character and camera back to the start, forming a cutout repeat which enables us to continue endlessly on the same pan. Such repeat pans are usually disguised the second, third, etc. times, by the introduction of overlays and other cutouts.

By having the field first at angle "a" the character appears to be going up hill and with the camera at angle "b" he appears to be going down hill.

The true vertical pan, Plate 3 (m), has so many restrictions in the way of lack of registration and the impossibility of using overlays etc., that we avoid it.

For such things as underwater effects which are otherwise hard to obtain except by double exposure, the vertical pan has an advantage in that you can move a glass or cell horizontally across the field while the pan moves vertically.

Plate 5 (o) is a circular pan which pivots at point "a". The cells remain stationary.

Plate 4 (n) shows a speed pan. Any pan over about 3/4 or 7/8 inch starts to become a speed pan. In hold positions verticals are drawn as true verticals. As we speed up the pan we lean the verticals as though both the character and background elements were being blown by a gale in the direction the character is running. This minimizes jittering. We also tend to streamline horizontally and elongate such things as furniture when the pan becomes very fast, and blur the trailing edge. At high speed such objects as overlays appear to lose width. This should be compensated for in layout. There are several schools of thought on the angle of verticals and blurring of edges. Plate 4. "O" is a swish pan where the camera sweeps from one hold to another hold very fast. Detail is reduced to a horizontal blur in the fast part which may be covered at up to 2 inches per exposure.

Action may be made continuous from any of these pans to any other by the use of cutout sections on the background. That is, a cutout forms the last field of one pan. After shooting this pan the cutout is lifted and placed to form the first field of the next pan.

After these combinations of pans there remains only the animated background, a term which is self-explanatory.

Camera moves can be made to itensify feeling and interpret story points. For instance in "Joan of Arc" the camera made fast trucks to closeups of the stern faces of jurors at Joan's trial. This strongly pointed out what Joan was up against and at the same time the speed suggested her agitated glances around the court room. A truck in can itensify the feeling of a character approaching, and there are many other possiblities. For instance, by reversing the procedure and using a zoom out truck we might itensify the effect of an explosion.

The layout man is sometimes concerned with cross dissolves, fades and wipeovers. These should be strictly related to the pacing of the picture. For instance, in approaching or leaving a sad sequence, the cross dissolve, fade or wipeover should be appropriately slow. Fast cross dissolves are useful for a flashback to an idea that is apart from the main line of the story, or to show action taking place simultaneously in more than one location. This technique along with partial wipeovers and held irises was successfully used in "The Cabinet of Dr. Caligari". Usually we try not to cross dissolve from one character to the same character closer up or farther away as this results in two images of the character appearing on the screen at one time which is undesirable.

For an example of a held iris (the old balloon idea to us) we could take a shot of a man on a cliff looking down at a distant object against a complicated background. We

could iris down and black out everything but the object. This gives us a clear picture of what the character is looking at and at the same time retains the distant feeling of the object stronger than could be obtained by cutting to a closeup.

Background Okay

At the time of okaying painted backgrounds the layout man should mentally review the footage and speed of action in the scene as a check against the amount of detail in the painting. It is advisable also at this time to check the background , particularly in hold positions, by use of field masks. Another thing to watch is character clearance, particularly behind the character's head. The weight of color used is also important as technicolor is apt to burn out spots which are too high in key and lacking in pigment. This point applies also to the painting of overlays which are shot on the top level and therefore receive the most light. Painted backgrounds should always be carefully considered as to their relation to preceding and

following backgrounds rather than as separate easel pictures. The use of adequate reflected light in the background painting is worth remembering. The feeling of depth can be heightened in the focus of a painted background by painting soft dark overlays leading back to a sharp middle distance. The reverse of this system is also used successfully. We should look for places where we can use interesting textures and contrasting surfaces, such as a reflecting surface against a dull surface, Plate 1A (36). Sometimes we become preoccupied with form to the extent that our set looks somewhat like a soap sculpture.

Model Cells

In checking the development of character models the layout man should carefully watch the weight of colors used relative to the values he intends to use in the final background in order to insure high legibility. If the character is a villian, considerable weight in the color is appropriate. He should

also see the character is not cut up in color. These considerations apply also to animated prop models.

In designing props for animation simplicity is the keynote -- a matter of a few lines more or less in a model means a considerable difference in time spent on cleanup and inbetween. Character of prop models should be related to the literal or fanciful nature of the story. This would have a bearing on color and the degree of humor in the selected props. A good cartoon instance of the humorous approach to props is shown in Harriman's Krazy Kat strip. In checking model cells of props or characters for individual scenes, we must particularly watch for the consistent carrying of such details as buttons etc.

Frequently we find our settings are quite prosaic in comparison with the fantastic character of other elements in the cartoon. This is a disharmony to be guarded against.

Plate 1A (40)

A reminder that shadows can be very helpful. In otherwise blank backgrounds behind closeups the introduction of a soft shadow cast from offstage can step up a design while leaving the character dominant. In theatrical settings we can add interest by using multiple shadows as cast from a number of light sources. Our present mechanics do not enable us to animate practically soft edged shadows cast from characters in action.

Plate 1A (41)

An unusual mood is induced by off perspective.

Plate 1A (42)

Design for a movie setup by Anton Grot. We are in a somewhat literal era and could benefit by studying live action pictures for the element of mystery. For instance, in the setting illustrated the action could start in a well lit area. The character could move back into shade

and finally his silhouette could rise and disappear over the crest of the hill. This in some cases would be more dramatic than brilliantly lighting the action throughout. See also Plate 1A (43,44,45,46)

Plate 5 (Drawing of Cigarette)

When selecting ones viewpoint and pose in making action sketches the silhouette is a vital matter. This plate shows how unrecognizable a familiar object can be. We have to design so that "he who runs may read" therefore we try to select a view of our character which would still be expressive of the action even if completely filled in with black. In "The Tortoise and the Hare" there were excellent examples of good silhouette action.

Plate 1A (47)

By the late Joseph Urban who had a good simplified architectural approach. He didn't put every pebble into his settings.

Plate 1A (48)

An example of Robert Edmund Jones' handling. A mysterious, romantic type of expression in stage settings. This was apparently done on a gray card. Worth studying for effective handling with economy of means.

Plate 2 (49)

A powerful rendering by Norman Bel Geddes.

Plate 2 (50)

By Bel Geddes for an entirely different type of production. It is a good indication of versatility. A montage of ideas which puts over a zippy metropolitan feeling.

Plate 2 (51)

The first of a series from Bel Geddes' "Dante's Inferno", which, owing to the expense, has never been produced. Contains good ideas in theatrical lighting. This was the only set he planned to use, but by juggling the lights, a great many

different effects could be obtained. The circular feeling of the pit in the center is obtained by a number of short straight lines giving the impression of a circle. Bel Geddes felt this was more interesting than the use of curves.

Plate 2 (52)

The pit is obliterated simply by moving the light back and casting strong shadows over that area.

Plate 2 (53)

The same set, a dramatic effect by search-lights.

Plate 2 (54)

Another effect on the same set, with light in the pit only. The weird figures are actually the actors' costumes, some thirty feet high.

Plate 2 (55)

The mysterious effect heightened by vignetting off into darkness.

Plate 2 (56)

An unusual example of silhouette value. Bel Geddes has piled the actors on top of two pillars to form a wing-like effect by the massing of their costumes.

Plate 2 (57)

Here for the first time we see the actual source of light. This represents Dante descending from Heaven.

Plate 2 (58)

A strong top light brings out the central figure dramatically, and again the set changes appearance.

Plate 2 (59)

Here is a "gingerbready" example by Max Reinhardt -- valuable chiefly as something to stay away from, but interesting as a manifestation of one who is regarded as a master of staging.

Plate 2 (60)

Perspective shot by Anton Grot. Thinking in terms of tone against tone rather than in line.

Plate 2 (61)

Another Anton Grot work in which a simplified tonal approach is evident.

Plate 2 (62)

This, also by Grot, shows his painter's approach.

Plate 2 (63)

Here is a strong contrast, by W.C. Menzies, who thinks largely in terms of line. It is interesting to see how two men in the same business of visualizing use such different approaches.

Plate 2 (64)

Another by Menzies, again showing how line conscious he is.

Plate 2 (65)

A design for "The Thief of Bagdad" by Menzies.

Plate 2 (66)

An example of a quaint handling which we haven't used so far. Japanese print effect

with a reasonable amount of texture, shows a knowledge of Japanese dark-light patterns apart from actual light and shadow created by a light source.

Plate 2 (67)

An unusual style. It has a toy-like effect in handling which could be applied to cartoons.

PLATE III

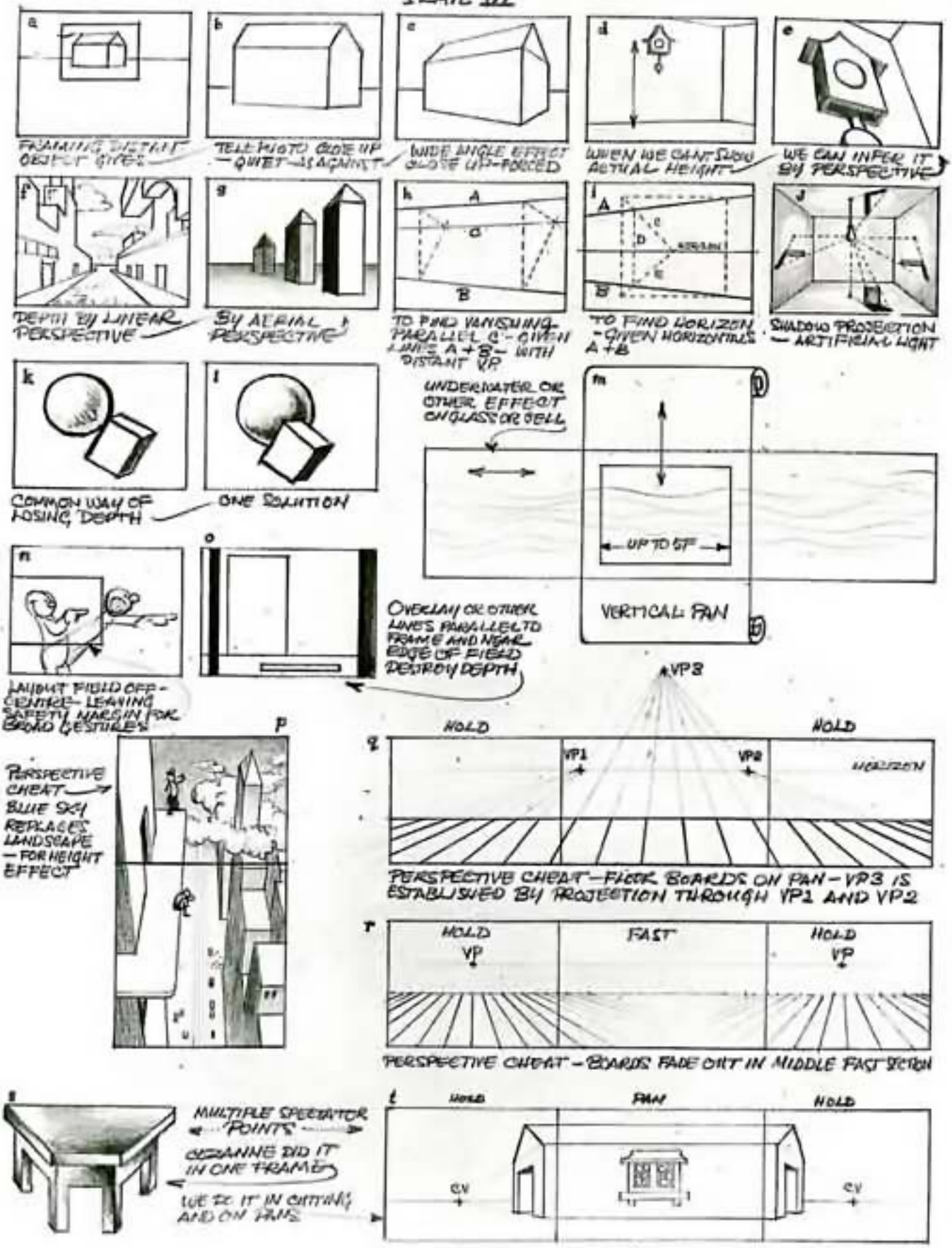


PLATE IV

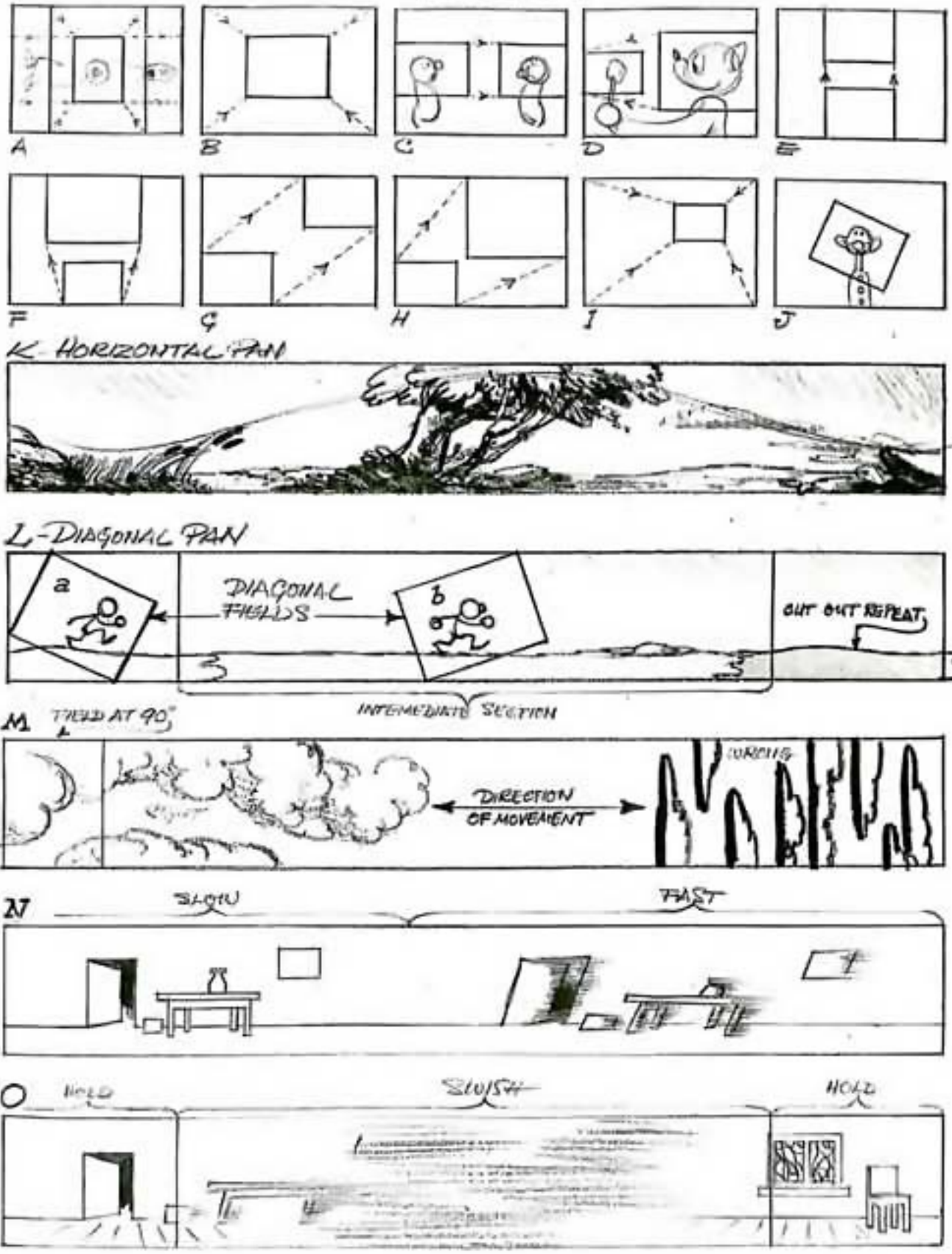
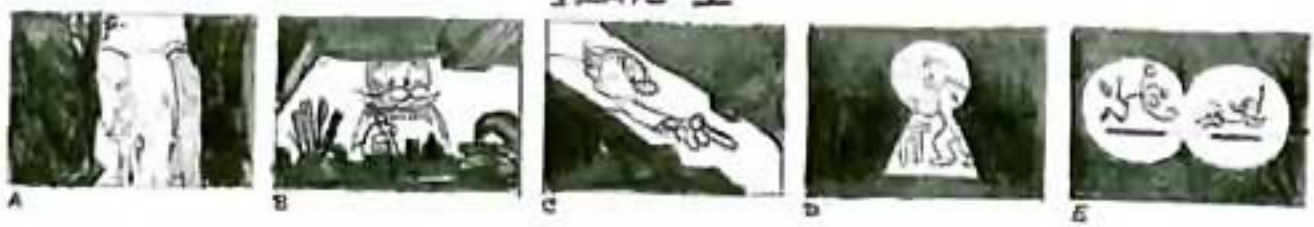


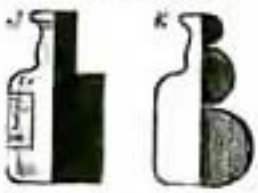
PLATE V



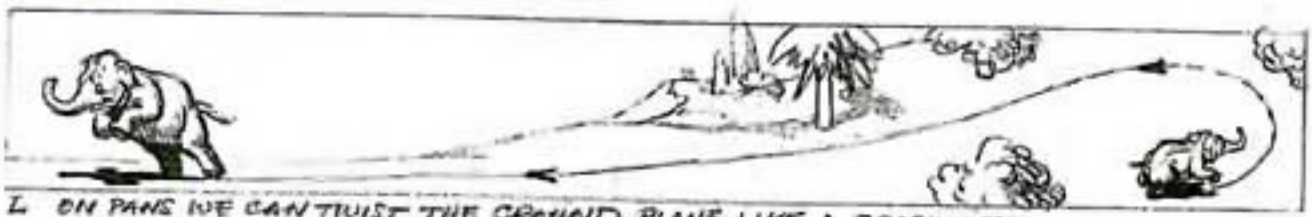
TRAINING CHARACTER IF NORMAL HEIGHT

IF TALL — IF SHORT

IF SMALL



NUMEROUS ASPECTS OF ONE OBJECT—A BOTTLE ← AFTER PICASSO. IN GETTING WE TRY TO BRING ABOUT COMPLETE APPREHENSION BY A SIMILAR APPROACH.



L ON PANS WE CAN TWIST THE GROUND PLANE LIKE A PROPELLOR

M - INCREASING FORCE

1 1 DIRECTION

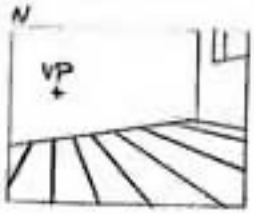
2 2 DIRECTIONS

3 3 DIRECTIONS

4 MANY DIRECTIONS

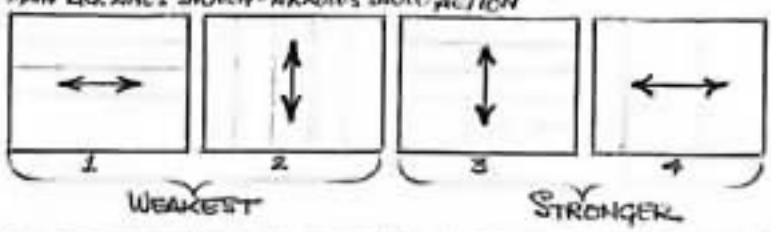
LEGIBILITY REMINDER 'A' - CIGARETTE — END VIEW 'B' ¾ VIEW

N



FLOOR DISTORTION - V.P. TOO FAR TO RIGHT

P - MOVEMENT IN PATH OF ACTION, BACKGROUND AND FRAME RELATION. MAN E.G. LINES SHOWN - ARROWS SHOW ACTION



WEAKEST

STRONGER

STRONGER STILL

STRONGEST

#1331

DEVELOPMENT PROGRAM LECTURE

"SOUND RECORDING"

By : Sam Slyfield

I. SENSITIVITY OF THE HUMAN EAR

Before we can arrive at a good understanding of sound recording and reproduction we must first know something concerning the sensitivity of the human ear. The human ear is very non-linear in its characteristics, being considerably less sensitive at the extreme low and high frequencies than it is to frequencies in the middle register between 800 and 6000 cycles. The chart which I have given you, which is captioned LOUDNESS OF FAMILIAR SOUNDS, has been made as a result of a survey by the Bell Laboratories, and is the latest authoritative information of this type available at the present time.

Inasmuch as the sensitivity of the ear is measured in decibels, we must first consider this unit. Practically speaking, the decibel is the unit of relative gain or loss in sound. The ear of a trained musician, or one trained in listening to sound, can recognize a change of one decibel on a sustained note, but the average ear will not recognize changes of less than 3 decibels. This unit is relative and the only time when it has a very definite value is when it is considered as from a zero reference

level, which, for our purpose, is considered as 6 milliwatts.

Referring to the chart, you will notice that the ear requires the minimum amount of sound energy for a given loudness at a frequency of 3000 cycles. However, from 1000 cycles to 35 cycles the ear falls off greatly in sensitivity, and at 35 cycles it requires 60 decibels more sound energy for a given loudness than at 1000 cycles. You will note that the ear requires approximately 10 decibels more sound energy at 10,000 cycles than it does at 1000, therefore we arrive at the curve which is labelled THE THRESHOLD OF HEARING. From this chart it is apparent that low frequency sounds, and, also, those of the higher frequencies must be amplified considerably more than sounds in the middle register, in order to produce a fairly flat response to the ear.

On several occasions we have been requested to record a tuba, or some similar low frequency instrument, in which a terrifically loud sound was required. The tuba having a range of approximately 45 to 350 cycles appears in a place in the audio spectrum where the ear is relatively insensitive, and when this particular sound is recorded to full track it will not sound nearly as loud as expected. To demonstrate

the relative sensitivity of your own ears we will run a frequency reel on which the following frequencies are recorded at constant amplitude -: 1000 cycles (used as a reference frequency, and the point from which you can judge the sensitivity of your own ears)
50, 100, 300, 1000, 2000, 3000, 5000, 7000, 8000, 9000, and 10,000.

You will note that the frequencies between 1000 and 5000 cycles are fairly loud and that the frequencies below 1000 cycles, and, also, above 5000 cycles are apparently attenuated. This effect is due to the insensitiveness of the ear at the higher and lower frequencies, as each frequency on this film is recorded to full track. However, at 7000 cycles the speaker itself is down somewhat in volume, due to the fact that the standard Academy curve for the theatre speakers attenuates the high frequency end, as this seems to be desirable at the present state of the art.

Sounds in the region of 3000 cycles will appear louder to most ears than other frequencies which you have heard. In a great many instances the low frequencies are actually felt as well as heard, and you will notice on the whale sound which we have run that the seats actually vibrated at certain frequencies and we had the sense of feeling as well as hearing the low frequency sounds. In the picture SAN FRANCISCO this

vibratory effect was particularly apparent, as the sound which was used as the earthquake was simply a warble frequency between 20 and 50 cycles. The gain of the reproducing amplifer was raised to the point where this effect was quite pronounced. Some discretion must be used in running prolonged sounds of this type, as the low frequency rumble will cause light and other fixtures to vibrate to the point where there is danger of them falling.

II. PRODUCTION OF SOUND

Sound waves are set into motion by various means and travel at the rate of approximately 1100 feet per second. A good mechanical analogy of this is that of throwing a stone in water. The impact of the stone in the water will cause waves to be set in motion and radiate out in all directions from the point of impact and gradually decrease in amplitude until the energy which caused the wave motion has been expended. If an object is placed in the path of the waves, it will reflect the waves and set up a wave motion in a different direction. This effect is analogous to the manner in which sound waves strike walls and other objects in a room and are reflected. This creates a rather complex wave form, and, properly controlled, results in the very desirable effects of reverberation. Improperly

controlled, these reflected sound waves may cause the equally undesirable effect of an echo.

Sound may be produced electrically by passing a comb between a photocell and a light source. When the teeth of the comb are moved rapidly between the light source and the photocell, a high-pitched sound is heard, and when moved slowly a sound of much lower frequency is audible. In this case, the teeth of the comb when moved rapidly through the light path cause a great many light variations per second to strike the photocell, and when moved slowly the light variations will be less rapid and the frequency of the sound produced will be considerably less. Another simple manner in which sound may be produced is that of scribing lines across the sound track area and then running the film in the normal manner in a sound head. In the test which we have heard, one line was scribed across the sound track area each 8 frames, then a line each 4 frames, a line for each sprocket hole, and, finally, 2 lines for each sprocket. You have noticed that as these lines become closer together on the film, tone was produced. The resultant tone for one line per sprocket is 96 cycles, and 2 lines per sprocket gave a tone of 192 cycles. This latter sound is very similar to a razz. Film travels at the rate of 24 frames per second, and, inasmuch as there

are 4 sprocket holes per frame, the sprocket frequency would be 4 x 24, or 96 cycles per second.

III. ACOUSTICS

We have made a great many experiments on this stage in order to improve the acoustic conditions, and have finally arrived at the result you now see. The west end of the stage is made of wood and splayed in such a manner that there will be little or no reflection from one end of the stage to the other. The opposite end of the stage is acoustically treated with rock wool over which strips of wood are placed and topped with muslin. This muslin has been sprayed with a very thin coating of paint and gives approximately the condition for which we have aimed; that is, a fair amount of low frequency absorption, together with about the desired amount of high frequency reflection. You will also notice that we have an overhead splayed structure on the west end of the stage which assists materially in adding life to our orchestra recordings without the undesirable echo effect which was previously mentioned. On the southwest and northwest walls we have large wooden doors, which are lined with rock wool on the back sides. These doors can be swung wide open, in which position they give an absorbtive surface instead of reflective, and, thus, allow

a certain amount of control over the reverberation.

IV. MICROPHONE PICK-UP

There are a great many different ideas about microphone pick-up, but from all indications each stage, or set, will have a best way in which to pick up for that particular stage or set. On this stage we have tried one microphone pick-up with very good success, particularly on orchestras, where a great deal of reverberation is necessary. However, for most of our orchestra recording we have found that two or three microphones have given us the best results. We always use a back microphone, which is placed about 15 feet in front of the screen and about 15 feet from the floor, and a violin microphone which is placed at various distances from the string section of the orchestra. On occasions when woodwind sections are to be predominant, we also use a woodwind microphone placed at such distances from this section as circumstances seem to dictate. These setups have given us the intimate tones of the instruments as well as the reverberation, which is so desirable and adds to the apparent loudness. On orchestra recordings, we pull back most of the drapes on the sides of the stage, making it as live and reverberant as possible. For dialog recording, this amount of

liveness on the stage would be very undesirable, consequently the drapes are drawn over the walls and the live west end of the stage cut off by means of additional curtains which are drawn across the middle of the stage. Microphone pick-up is extremely important in dialog recording, as the microphones which we employ are directional in their pick-up characteristics, and the talent must be placed properly in front of the microphone; otherwise the recorded dialog will have an off stage effect. This is, of course, desirable at times and is often resorted to to produce such effects. The type of microphone which we use is very faithful in its reproduction, and its operation is based on one of the oldest theories of electricity; that is, when a conductor is moved in a magnetic field a current is induced in the conductor. In our ribbon microphones we have a permanent magnet between whose poles a thin corrugated ribbon is suspended. When the voice waves strike the ribbon, they cause it to vibrate in this magnetic field and, thus, induce a current in the ribbon. The current induced in the ribbon is then applied to the primary of a coupling transformer, the secondary of which is connected to one of the pre-amplifiers which you see on the wall.

V. AMPLIFICATION AND SOUND RECORDING

The minute current generated in the ribbon, as indicated above, is then amplified by means of the pre-amplifier to such a level that the danger of pick-up from other electrical devices is reduced to a satisfactory point and then transmitted to the voltage amplifier in the Monitor Room through the volume control, or mixing panel. The output of the sound now being controlled by the mixer is amplified through two other channels, one feeding the monitor speaker system, and the other the recording galvanometer by which light from a standard source is reflected on to the film by means of a small mirror attached to the galvanometer. The galvanometer being actuated in accordance with the voice waves, the light which it reflects on to the film will give a very faithful oscillographic record of the original. There is still another amplifier which performs a very important function in a recording system; that is, the ground noise reduction amplifier. As the name implies, this amplifier is used for the purpose of reducing the amount of ground noise (hiss) which would otherwise be heard with the sound. This ground noise reduction is accomplished by means of shutters which move parallel to the sound track length and follow the envelope of modulation.

This amplifier is adjusted in such a manner that the shutters move slightly ahead of the signal, thus providing a narrow margin of transparent film between the modulation tips and the shutters. During the period of low or no modulation, the shutters close in around the sound track area to the point where two small slits are exposed on the film approximately .003" in width, which reduces the hiss to a minimum.

You will note that we have a rather large monitor speaker which has been installed to give us approximately the same result which we may expect in a theatre. Inasmuch as it is extremely difficult to get one speaker which will respond faithfully to the large frequency range which our recording system covers, we have provided this standard two-way speaker system, which consists of 2 low frequency and 2 high frequency units. The low frequency units produce the low frequencies up to 250 cycles, and the high frequency units reproduce the frequencies above this. This provides a very satisfactory means of monitoring our recording and gives us approximately the same results which we might expect in the theatre.

A recent development in recording equipment has brought out a volume compressor, which is extremely useful and important in dialog recording. Our experience has taught us that this piece of equipment is

not desirable for most music and effects recording, but it is highly useful for dialog work. Most dialog talent will not make the "take" the same as the rehearsal, and, for this reason, it is very difficult for a mixer to tell just what to expect, as the talent may be high in volume on certain parts in rehearsal and then drop to an extremely low level for the "take." By means of the compressor the lower percentages of modulation are brought up to a satisfactory recording level, while the higher percentages of modulation which would ordinarily overshoot are compressed or held down in volume electrically. This volume compressor operates in 3 milli-seconds (3/1000th of a second) which, of course, would be too quick for the ear to detect. This compressor removes a great deal of doubt from recording and actually improves the understandability of most voices.

The normal volume range which we may record on film is approximately 40 to 45 decibels. With excellent processing, it might be possible to exceed these limits, but, commercially, it is seldom attained. Therefore, an orchestra which has a range of 75 decibels must be compressed and kept within the limits of the track, otherwise the overtones which appear on the ends of the main modulations will be lost and

the sound will not have the true richness of the original and will be distorted.

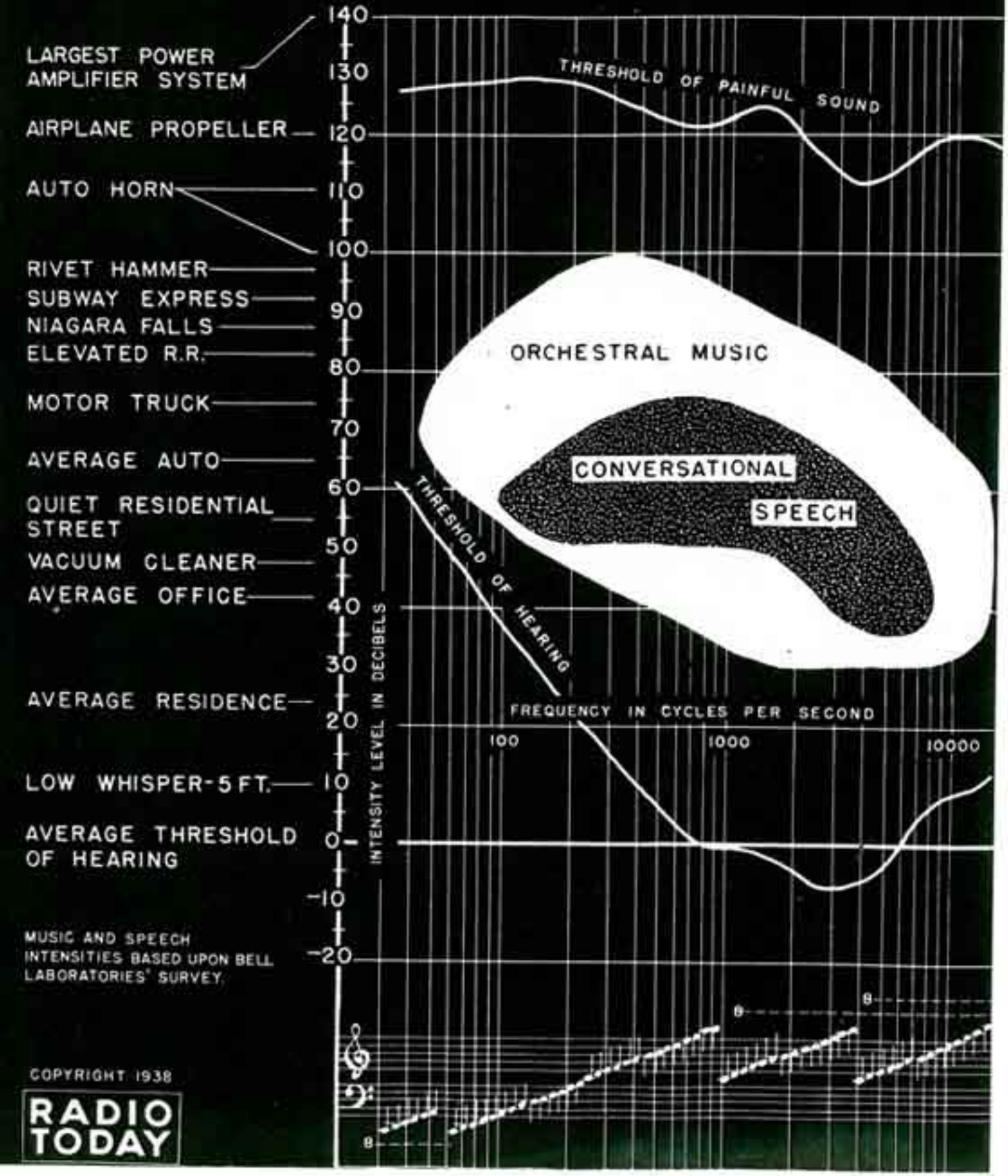
Other sounds where overtones are not important can be overloaded within practical limits, but overloading is not to be recommended. The demonstration of an overloaded piano track, which you have heard, is an excellent example of what happens when overloading is carried to the extreme. Another example of overloading came as a result of an endeavor to record a sheep's horn and make it sound terrifically loud. This sound is composed of a practically pure sine wave with no overtones. The output of a photocell, being dependent upon the amount of varying light which strikes it, could not produce a loud sound from this horn, as there were no overtones to cause a greater variation of light to hit the photocell, and the result was a fairly weak sound. When rerecorded for a preview this sound actually occupied the entire sound track area, and whenever this sound appeared the result was equivalent to fading the orchestra and other sounds practically out of the picture. This sound was finally re-shot with a trumpet which was rich in overtones, and the loud effect which was desired was attained.

VI. RE-RECORDING

In re-recording, the outputs of several sound heads in which sound track is run are fed to the mixing panel where the volume of each may be controlled. The orchestra is on one or more tracks, the dialog on another, and the effects on still another track. These are run on sound heads which are electrically interlocked with each other and with the projection machine. The picture is run through once for checking the sync of the picture and sound, at which time the sound levels are generally not changed. On succeeding rehearsals the mixers endeavor to arrive at a proper balance, and, after the picture has been rehearsed a few times, the levels are discussed by the musical director, picture director, and sound men, and levels changed as may be deemed necessary. This process is repeated until all are fairly well satisfied that the proper balance has been found, and then a re-recording is made, at which time the outputs of the several sound tracks are balanced and recorded on one film. This first re-recording is used in negative form for preview purposes. After the preview, the picture is again discussed and points indicated for correction and a second, or final, re-recording made. If this is satisfactory, the film is turned over to Technicolor, where the picture and sound track are

LOUDNESS OF FAMILIAR SOUNDS

Intensity and frequency ranges of speech and music
Decibel levels for installers of sound equipment



MUSIC AND SPEECH INTENSITIES BASED UPON BELL LABORATORIES' SURVEY

RADIO TODAY

combined on a composite film for theatre release.

VII. REPRODUCTION OF SOUND

The music test reel we have run is made up of excerpts from sound track of various pictures dating back to KING NEPTUNE which was recorded on Cinephone equipment, without noise reduction, in 1932. It is interesting to note that we have gradually increased the amount of reverberation in our music recording to a maximum, which appeared in FERDINAND THE BULL. The music for FERDINAND was recorded in this manner as it was designed to appear under the narration, and a reverberant type of music is much better for this purpose. An excellent example of this type of recording appeared in THE PRISONER OF ZENDA. In this picture there were many softly whispered lines and the apparent loudness of the musical background was not changed greatly and in no way interfered with the understandability of the dialog.

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Many interesting questions have been asked during this series of talks, and some of the questions and answers appear on the following pages.

Q. Is the complete frequency range shown on the chart within the audible range of the human ear?

A. Yes. Most normal ears cover this frequency range. However, occasionally we find ears that do not respond to frequencies above 6000 cycles and have rather sharp cut-offs in this region. This is an abnormal condition. Young people, musicians, and persons trained in sound often hear fairly well up to 16,000 cycles.

Q. Is the frequency of an earthquake very low?

A. Yes, the frequency of an earthquake is very low. In the picture SAN FRANCISCO, the earthquake sound was produced by means of a warble frequency between 20 and 50 cycles. This gives the rumbling effect and creates the sense of feeling as well as hearing the sound.

Q. At one time we had a shell for orchestra recording. Why was this abandoned?

A. The shell which we formerly used was an experimental set-up and was abandoned when the Monitor Booth position was changed. The treatment of our stage at present includes the desirable features of the shell and eliminates the undesirable ones.

Q. At the time this stage was built, wasn't it considered good practice to make everything as dead as possible?

A. Yes, it was considered good practice to deaden the stage to a great extent, but the rock wool on the ceiling was used to reduce undesirable reflections which focused in various places and formed standing waves.

Q. What type of stages will we have at the new plant in Burbank?

A. The stages at our Burbank plant will be built in accordance with the best practices of this time. The dialog stage will have a fairly large amount of deadening material, as reverberation in dialog recording impairs the intelligibility and is only desirable in longer shots. Reverberation in dialog recording can also be introduced after the original recording has been accomplished and offers

no particular problem. The effects stage will have controllable reverberation; that is, the walls will be composed of large doors which will have a reflective surface on one side and an absorbtive surface on the other. Thus, by opening or closing the doors, the acoustic conditions of the stage may be changed. The orchestra stage will be built especially for recording music and little deadening material will be used. The end of the stage in which the orchestra will play will be composed of wooden surfaces, splayed in such a manner that there will be no direct reflection from one end of the stage to the other. The ceiling over this end of the stage will be likewise arranged. The side walls and opposite end of the stage will be acoustically treated by means which have not been definitely determined at this time.

Q. Why do you desire to record sounds of low volume at a higher percentage of modulation than they will be used in the picture?

A. This is done to improve the signal-to-noise ratio. In re-recording, this sound take is cut down in volume and the inherent film noise drops in proportion. If it is necessary to increase the volume of a recorded sound the film noise will be raised in the same proportion as the sound, and the noise becomes very objectionable.

Q. Is it desirable to use the volume compressor in recording effects?

A. No, under most conditions it is better to record sound effects without compression although there are some exceptions to this. As a rule, the compressor will restrict the volume to the point where the effects will not sound loud enough.

Q. Is it desirable to have a large amount of reverberation in orchestral music which is used under dialog?

A. This is very desirable because a reverberant type of music has a greater apparent loudness and when reduced in volume under dialog still seems comparatively loud and does not interfere with the understandability of the speech to any great extent. A notable example of this type of music recording was used in THE PRISONER OF ZENDA. The low whispering in this picture was practically

unaffected by a rather strong musical background.

Q. In re-recording the foreign versions of SNOW WHITE, wasn't a composite of all tracks, except dialog, employed? Could not this be done for the English version as well?

A. Yes, this composite track was used for the foreign versions, but it is not recommended for the English version inasmuch as each re-recording results in a loss in quality. This was done to expedite the foreign versions, as the re-recording would have otherwise been a rather long and drawn-out process.

Q. In recording an orchestra with one microphone, how is a balance obtained between the low and high frequency instruments?

A. By proper placement in relation to the microphone.

Q. Do trained musicians hear better than other persons?

A. As a rule, I would say that they do because their training in music has developed this sense to a much greater degree than in average persons.

Q. What frequency do you class as normal?

A. A frequency of 1000 cycles is considered as normal and all frequency response curves are shown as being up or down in level from this reference point.

Q. According to the chart, the sound of an auto horn is louder than that of the Niagara Falls -- is this correct?

A. Most auto horns are pitched in the register that sounds loud to the ear while the rumble of the Niagara Falls is of a very low frequency, and, according to the chart, you will notice that it requires considerably more sound of a low frequency for a given loudness than it does for the higher frequencies.

Q. What is 100%, or full track?

A. This condition exists when the tips of the modulations just reach the outer limits of the track.

You have seen this in many of the sound tracks which we have projected on the screen.

Q. Is there any way in which volume could be automatically controlled in a theatre?

A. This can be accomplished by means of a volume control track or by adding a volume expander to the theatre amplifier.

Q. In balancing an orchestra, can you figure the placement of the instruments according to frequency?

A. Yes, this is always done and instruments of similar frequency characteristics are grouped together.

Q. What do we gain by overloading?

A. Nothing but volume. Where the overtones are necessary to preserve the character of the sound, overloading would be very undesirable as the overtones which appear on the ends of the modulations would be lost.

Q. Do you expect the same amount of improvement in the years to come, as the music test reel shows which we have just run?

A. Yes, I believe there should be an even greater improvement.

Q. On Western Electric recording, can the volume be increased or decreased by processing?

A. Yes, in variable density track, the volume can be changed by processing over rather wide limits.

Q. Is a loss involved in transferring sound from acetate to film?

A. With the acetate equipment which we have here, there is a very definite loss due to the fact that the frequency response is rather limited. However, there is always a transfer loss even when transferring from film to film.

Q. Do you feel that the size of this sound stage limits reverberations?

A. Yes, very definitely.

Q. What is the difference between variable density and variable area recording?

A. Variable density consists of striations of varying shades of gray, while in variable area track, the actual width of the modulations varies from the bias lines to the full track width.

Q. Is there any way of reducing sibilant sounds when recording?

A. Yes, by means of filters.

Q. How did you get so much reverberation in the orchestra recording of FERDINAND THE BULL?

A. By making the stage as live as possible and having the orchestra play at a fairly low level.

Q. Why does the bell at a railroad crossing appear to increase in pitch as it is approached?

A. The bell does not change its pitch, but the sound which is heard by the ear is slightly higher in frequency due to the fact that the sound waves from the bell are reaching the ear more rapidly than would be the case if the listener were not moving. If we were travelling in a car at the rate of sixty miles per hour we would be approaching the bell at a speed of 88 feet per second. Sound travels at the rate of approximately 1100 feet per second; therefore, the pitch of the bell would be increased by the ratio of 88/1100, or 8%. The opposite condition would be noticed when going away from the bell and the pitch of the bell would appear to decrease.