

Production of the Little Star That Could

An Honors Thesis (HONRS 499)

by

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Muncie, Indiana

May 2001

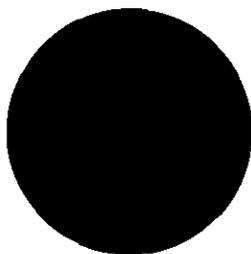
Graduation Date

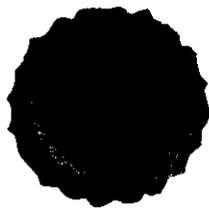
May 2001



Abstract

The purpose of this Planetarium show is to teach a basic concept of the stars and solar system to children. The show is designed for children who are approximately five years old. Among the concepts the children should learn are: the relation between a star's temperature and color, the variety of stars in the universe, the location of our sun in the temperature scale, and basic knowledge of the nine planets in our solar system. To get these concepts across, the show uses a cast of over 18 characters. The main character, Little Star, travels through the universe and meets several interesting stars in attempts to find some planets for himself. During the journey the audience will be educated and entertained. The following is a basic written guide on how to produce a planetarium show similar to The Little Star That Could.

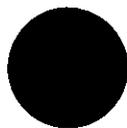




Acknowledgments



Thank you to Dr. Ron Kaitechuck, my thesis advisor and boss, for not only working with me the past three years as my honors fellow mentor and director, but also for his willingness to continue to assist me as my thesis advisor. I never could have learned or accomplished as much as I have without his endless patience. Thanks to the people who produced the original version and copies of the program. I would also like to thank Taran Harman for showing me how to use Microsoft Paint and Richard Maupin for his willingness to proofread my first draft. Appreciation also goes to my loving parents who have given me support throughout my academic career.





The Production of "The Little Star That Could"



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Initial Materials

- Production guide: explains how the program was originally produced by the creators
- Artwork: pictures to use to create slides for the program
- Script: written dialogue of the program
- Soundtrack: sound effects and dialogue on compact disk



Beginning the Process

1. First, copy the compact disk version of the soundtrack onto an ADAT (Alesis Digital Audio Tape) tape version. In addition to recording the soundtrack, it is also important to record a SMPTE (Society of Motion Picture & Television Engineers) time code onto a special ADAT tape. This enables the computer to program actions to occur at certain times during the show.
2. To get an idea for the show in general, it is a good idea to read through the script while listening to the sound track.
3. Repeat step two; this time making notes in the margins where a slide or special effect would be appropriate. Be sure to list the **exact** time that the action should occur.
4. With the timing for each slide determined, use the provided artwork to decide which picture will be desired at each time spot. You also need to consider where on the dome of the planetarium you would like each of the pictures to appear. At this time, it may be necessary to make additions to the artwork collection. For The Little Star That Could, I had to include several of my own images: the nine planets, the Milky Way, the imaginary galaxies, and the alien life form**.
5. When the dome location is known for each slide, determine the corresponding projector. Save this information for later, it will be needed for programming purposes.
6. Once a list of the number of slides needed for each piece of artwork is created, begin taking photos.

**See Appendix



Photography (using 35mm camera)

1. First, determine what type of film to use: Two main choices are Kodalith and LPD4**. The stars should be photographed in LPD4 and most of the other artwork in Kodalith.
2. A set-up similar to the one seen in the photo is most desirable. The floodlights are used to light the area being photographed and to prevent any shadows from darkening the image.
3. The lever arm is used to adjust the height of the camera. The reason for adjusting the height of the camera is to change the size of the image on the film (which becomes the slide). For smaller star images, move the camera further away from the artwork.

For

The Little Star That Could the heights are:

Little Star: 22.8

Super Nova: 18.6

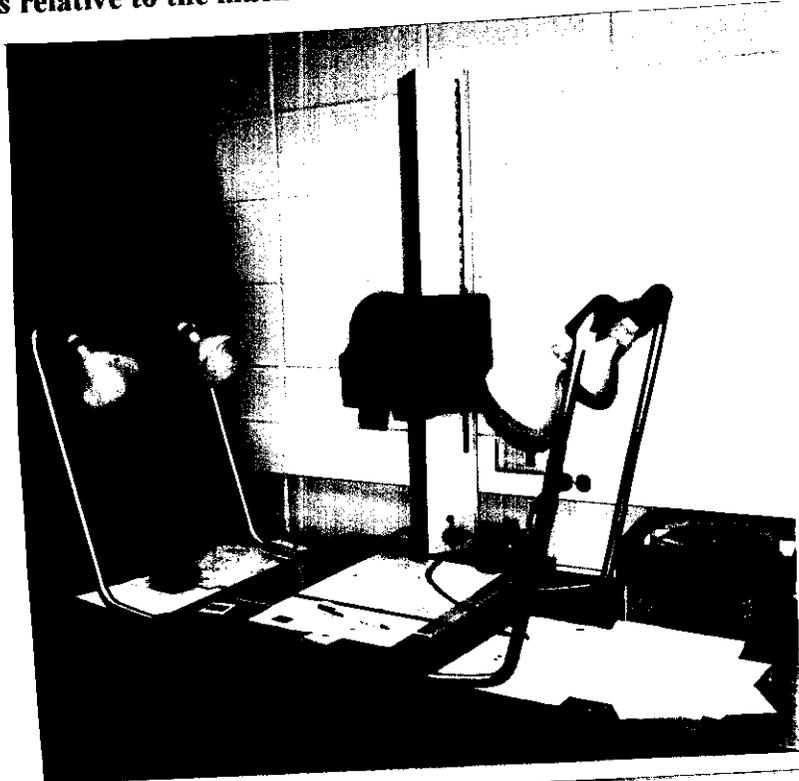
Blue White Star: 20.5

Old Star: 22.75

Big Daddy: 22.5

Double Star: 21.65

All values relative to the machine used, no particular units.





Photography

4. Next, determine the exposure time that will best suite the images being photographed**. (This will vary depending on distance from artwork and film type.) Another concern deals with the eventual mounting. In order to make sure the alignment of the slide will fit the circular mounts*** used for the stars, place the desired circular mount in the camera while shooting several trial heights.
5. Once all the settings are determined, begin taking pictures.
6. When taking photos of the credits, a level may be useful. Keeping the camera level allows the text image to be level.

*Note: The film is high contrast, so when taking pictures of images on the edge of a paper be sure to perfectly align another sheet of identically-colored paper to the end to prevent a line in the final image. A smooth piece of glass may be used to cover the area of interest to prevent a shadow effect.

**See appendix

***See section on mounting



Developing**

1. Must have a dark room with the following equipment and supplies:
 - Developer for Kodalith and LPD4 (RT 11, Dektol respectively)
 - Light safe developer container
 - Film reel
 - Sink
 - Clock

2. Begin with the exposed roll of film, and preventing the film from "seeing" any light but red light, roll the film onto the film reel.

3. Place the film reel in the light-safe container and seal.

4. If desired, at this point it is safe to turn on a white light.

5. Set timer and pour the developer into the light-safe container. (timing: 2:45 minutes for Kodalith developer, 3 minutes for LPD4)

6. Quickly pour out the developer into a beaker and add stop bath to the container. Reset the timer for a minute (timing from now on is good for either type of film). Depending on the developer that was used, you may pour the contents of the beaker back into the developer container for re-use. (Possible with Dektol, not with developers activated by a combination of chemicals.)



Developing**

7. Checking the color of the stop bath (if it is still yellowish, good; if it is purple, bad), you may pour it back into the stop bath container, set the timer for five minutes, and pour the fixer into the light-safe container.
8. Pour the fixer back into the fixer container and begin a water bath.
9. Let the film sit in running water for at least ten minutes pouring out old water and refilling it several times.
10. After the water bath is complete, carefully remove the film from the reel and use a squeegee to dry. To complete the drying process, carefully use a clothes pin to clip the film to a horizontally hanging string for several hours.
11. Once the film is dry, you may begin mounting.

The
Darkroom
2





Mounting

1. To "mount" the slides simply means to cut the film into frames and place each frame in an actual projector slide. A slide mount may come in a variety of cutout shapes. There are circular mounts that are slides with a circular window cut into them. Thus when put into a projector empty, only a circle is projected across the room. If a slide is put inside the circular mount, then the image appears to be inside a lit circle. Other slide mounts are simple rectangles allowing an entire image to be lit and projected across the room.
2. For the stars in this program, use the circular mounts to create a circular image on the dome. To make the different stars vary in size use different sized circular mounts.

Little Star: 14mm

Super Nova: 22.9mm

Blue White Star: 18mm

Big Daddy: 18mm

Old Star: 18mm

Double Star: 18mm

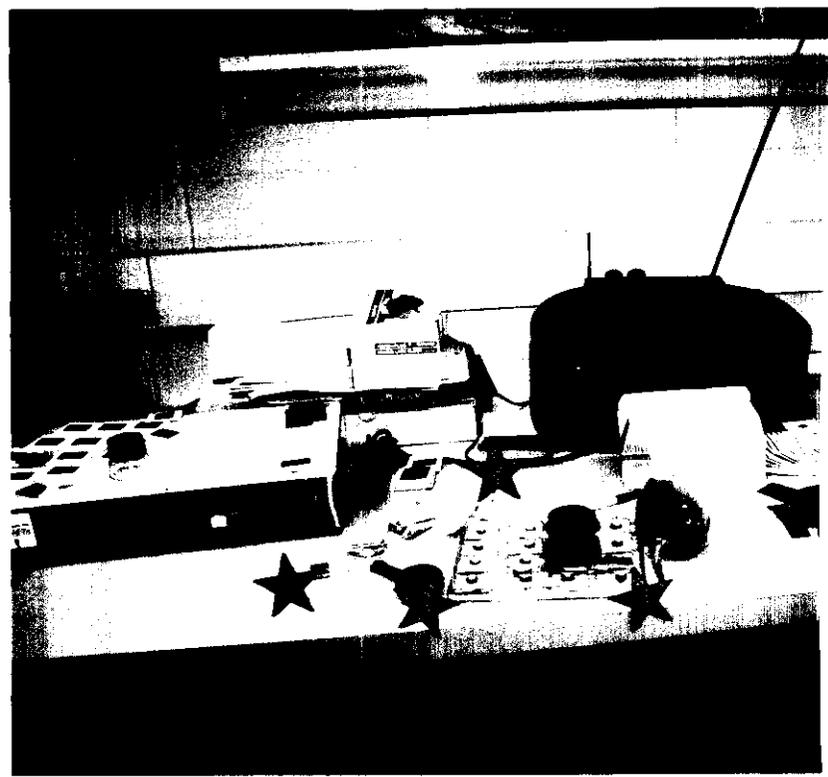
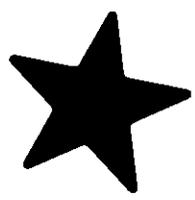
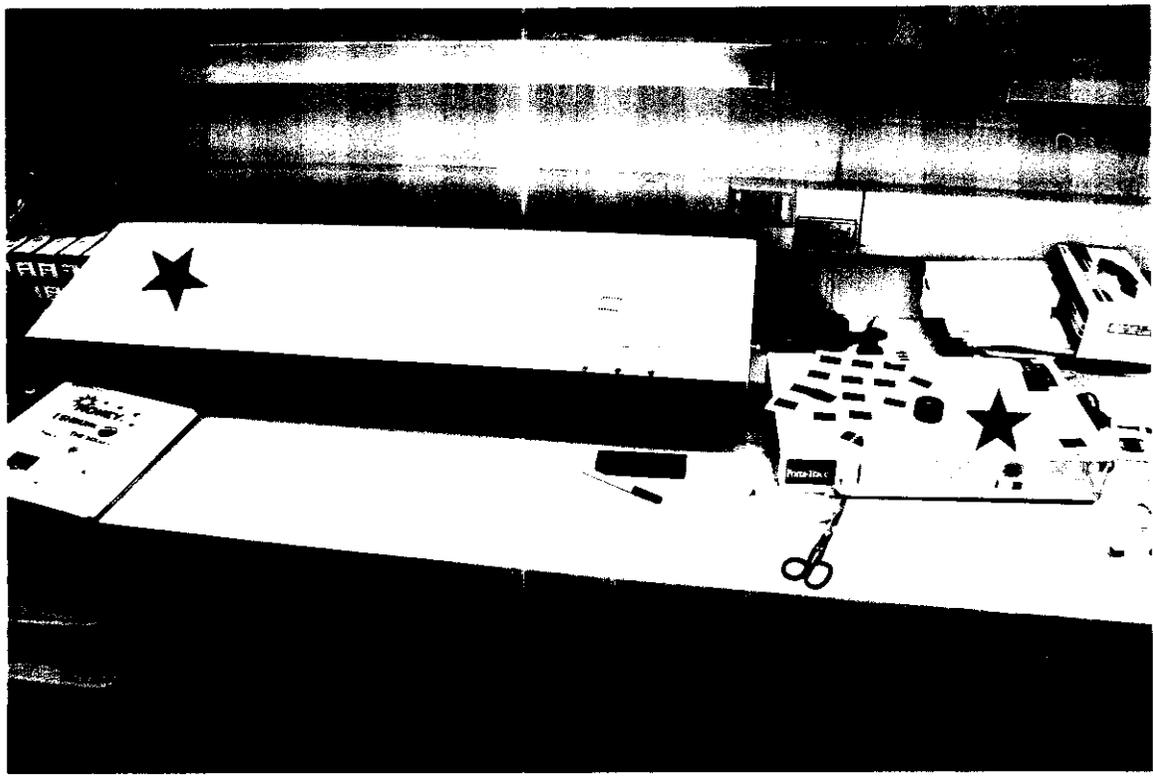
3. Simple rectangular mounts are used for the Milky Way, the planets, the thermometer slide, the star comparison, and for all of the text slides.
4. A special mount is required for the Globular Cluster. First mount the cluster image shot in Kodalith in a square slide (thus creating a bright blur of stars). Then, mount the face over the cluster in the same slide. Be sure to match the face in approximately the same location in each slide.
5. To mount the star an image, a hole-punching device is needed to make the image frame snugly fit on the two pegs inside the slide mount. Align the frame (emulsion side down or shiny side up) using the cross hairs provided and punch the holes.



Mounting

6. Using cotton gloves, a special film duster, or some other soft device dust the slide and frame. The reason why dust needs to be removed is because the dust will block light from reaching the other end of the planetarium dome and make the image appear dirty. (This may prove to be one of the more frustrating tasks in completing the production.)
7. Once the frame is mounted in the slide, place the gel in the slide. A *gel* is a specially created piece of soft plastic used to colorize a slide. The gel should also fit in the slide using the two pegs. If the color is not rich or dark enough, just add another gel. Be sure to dust each piece before placing it into the slide.
8. When satisfied with the color, (check the approximate brightness with a light table) close up the slide and move on to the next one.
9. After several slides are completed, find some light source (preferably a light table) to check if there is any extra light seeping through the slide. If there is an unwanted lit portion, use specially purchased slide tape (slivery tape) to cover the hole.
10. Next, you begin loading the slide trays.

Work Area

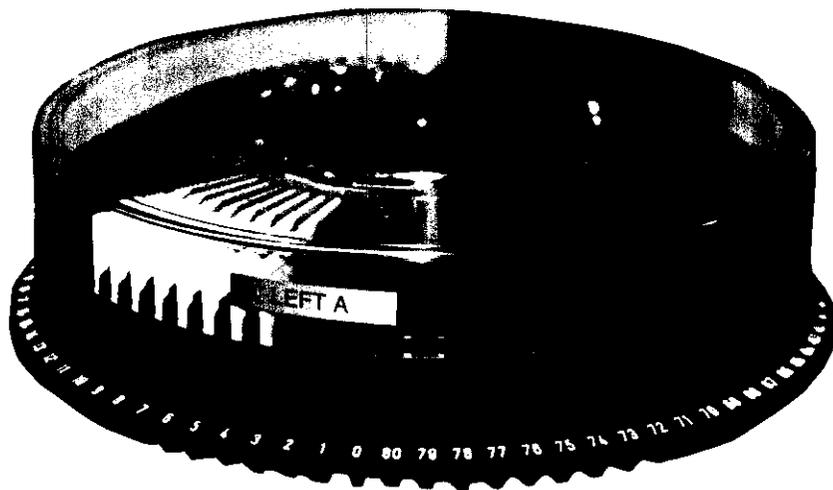


- ★ Hole
- ★ Glove
- ★ Gels
- ★ Dust

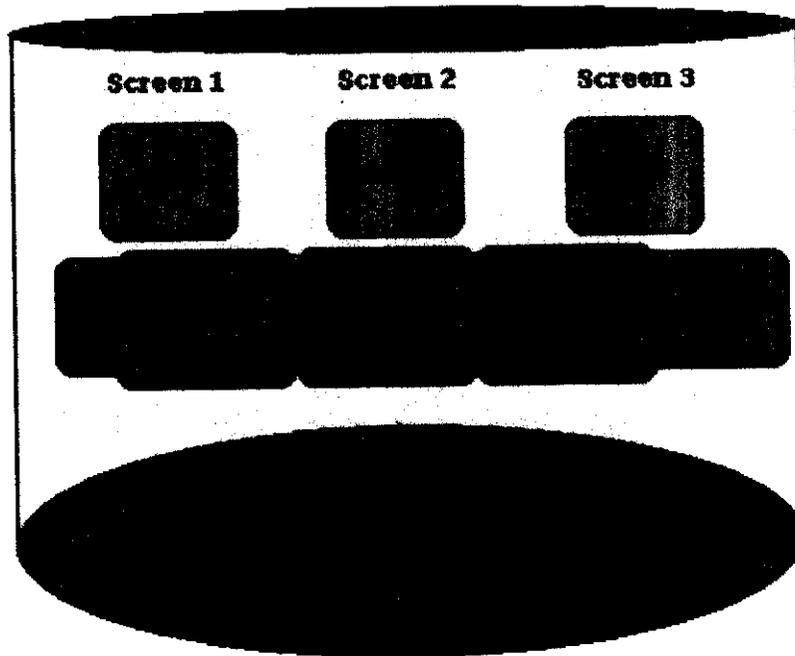


Slide Trays

1. Retrieving the list of where each slide is to appear on the planetarium dome and each corresponding projector, decide which slide goes in which tray. The Ball State Planetarium uses over 30 projectors; see the following page for a small tour.
2. Once the slides are completed and the list of where each slide goes is written, begin placing the slides in the appropriate trays. Each slide should be placed upside-down and backwards. However, always check the placement by trial and error. Use whatever direction makes the image look the best on the planetarium dome.



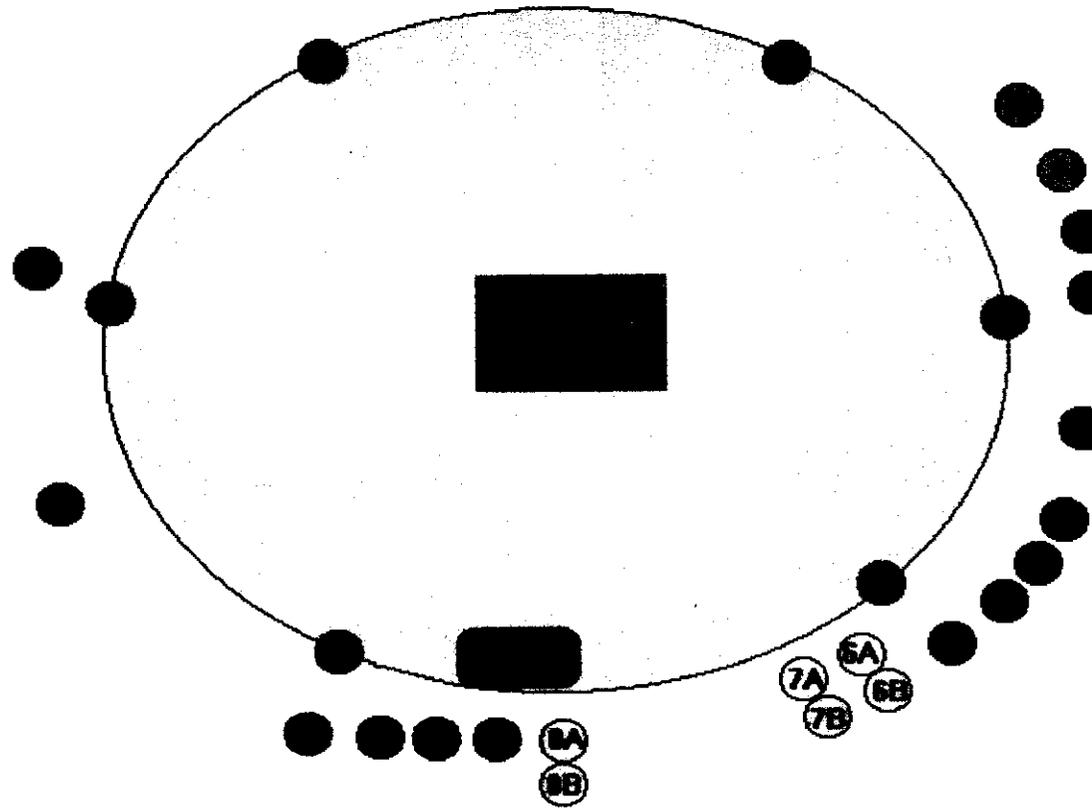
Planetarium



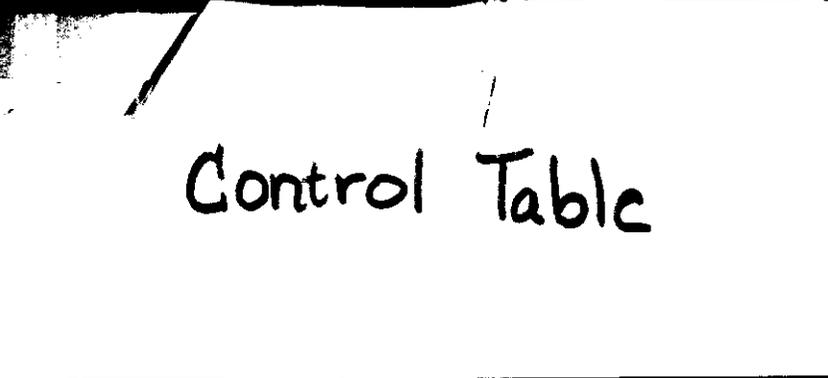
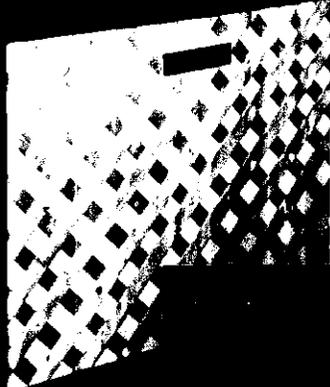
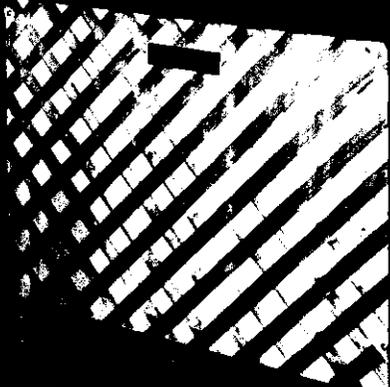
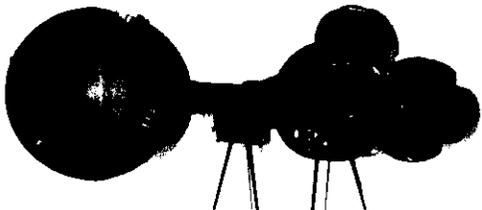
- Main screens
- 7 Panaromaic screens
- 3 Horizon screens

As seen from the
Console

Over-Head View

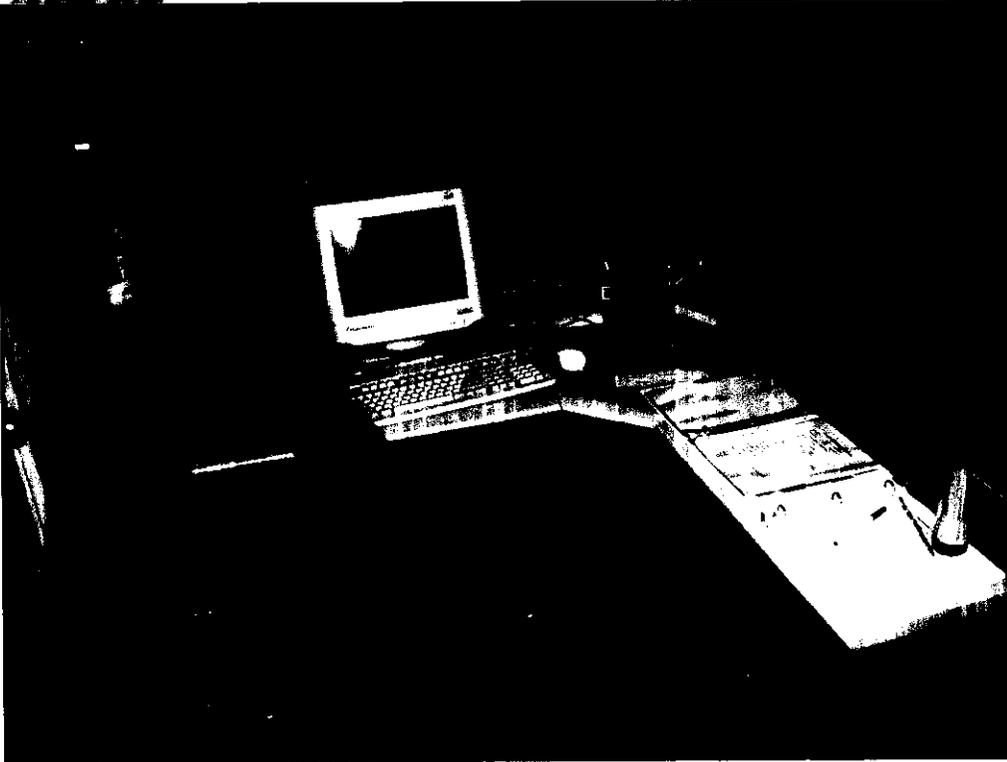


- All Sky Projectors
- Video Projector
- Panoramic Projectors
- Right Screen Projectors
- Horizon Projectors
- Middle Screen Projectors
- Left Screen Projectors



Star Ball

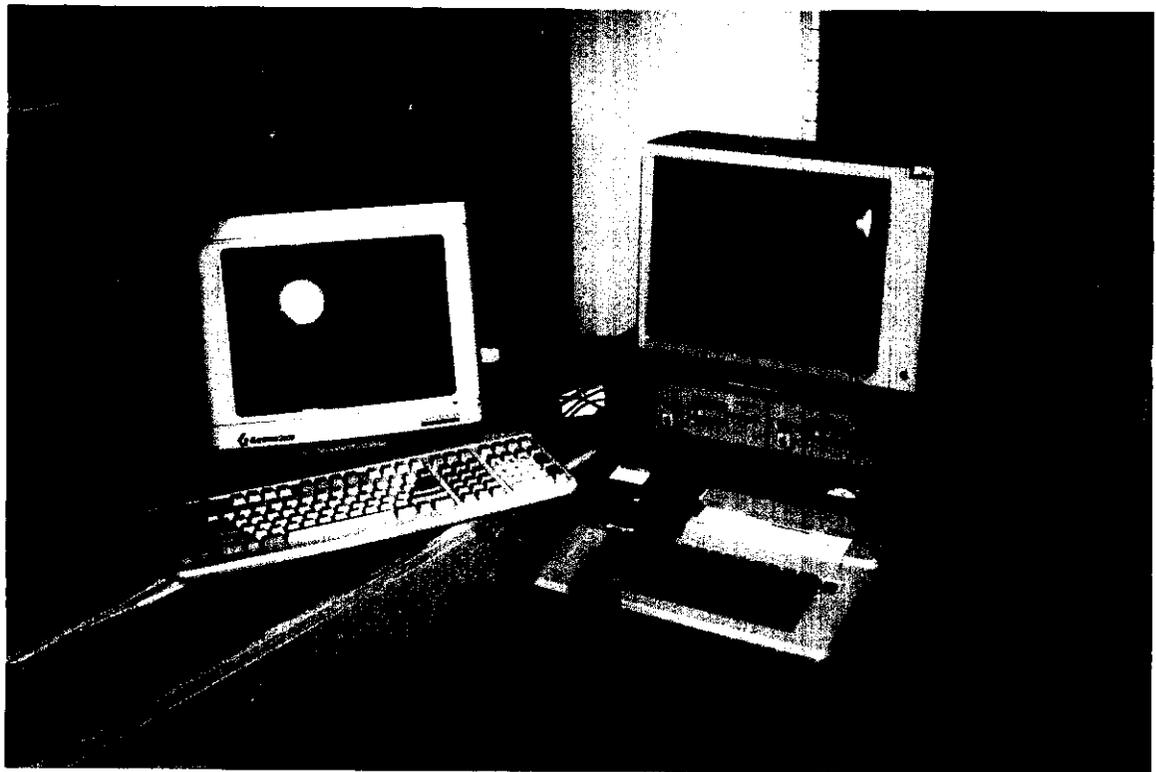
Console





Programming

1. The Ball State Planetarium is completely automated. Therefore, when making a planetarium program it is necessary to program two computers.
2. The IBM computer controls the projectors and various special effects.
3. The Apple II e computer controls the room lights and the motion of the star projector in the center of the planetarium.
4. First program the IBM because within it's programming is the effective switch for the AppleII e. The IBM "calls" on the Apple to proceed to the next command.





IBM Computer Programming

1. The following is needed to begin programming the IBM computer:
 - a. the list of the times that something is suppose to happen
 - b. the slide tray location of each slide
 - c. the ADAT tape

2. To create the SMPTE time code on the computer file, run the ADAT tape with the connection between the computer and ADAT tape set to write instead of read. Go to record SMPTE time code from the main menu on the computer. While listening through the soundtrack, hit the space bar at each time corresponding to a listed activity. Save the coding under the name of the program.

3. The computer now has a file for the basic outline of the program. Turn the switch back to read to allow the desired commands to be typed in at each appropriate time slot.

4. Reboot the computer and then go to the main menu and open the created file (the screen should have prompt for the key stroke that corresponds to the main menu screen).

5. To enter commands, go to edit time cues.

6. The screen has basic instructions, type "c" to change a command line. The computer will then have a prompt to choose a projector (they are numbered by which screen the projector corresponds to).



IBM Computer Programming

7. Once a projector is chosen, it will be necessary to choose A/B/C. The "A" is the first projector to cover a particular screen; the planetarium ususally has a least two projectors for any given "screen." This gives the programmer the ability to fade in one slide and fade out another at the same time.
8. To "call" on a special effect, type "u" for utilities. (Cue information is also located on this page. Once on the utility page, type "c" and then type in the desired cue description. This description will appear in the editing mode and will greatly aid in the de-bugging process.) While still on the utilities page, use "t" to toggle to a number choice. Each special effect is numbered to correspond to a "bit flag" on the console. Simply type in the number of the desired special effect to turn it to the "on" position. For example, the number 1 is used to turn the stars on.
9. In order to keep a special effect "on" through different command lines, it is necessary to repeatedly toggle the special effect number.

Note: whenever asked if you want to shift the time codes, always answer yes.

NEVER TYPE NO!!!! Hitting enter without answering yes is the same as typing no.

This moves all the codes to a different time.



Apple II e

1. First create a formatted disk. The best way to do this is to use the two drives on the computer.
2. Place an empty disk in the B drive and an old show in the A drive.
3. Copy the old material onto the new disk and save. Then turn the computer off: remove the old show to insure the safety of the old show.
4. Place the new disk in the A drive and turn the computer on. Delete the old time cues.
5. After booting up, type record in the provided blank.
6. Hit enter through the date and time questions.
7. Once at the main screen, a list of numbers should appear on the left and list of commands on the right.
8. Type "R" to turn off the carriage return command. This prevents the need to hit return after every time the user wishes to toggle through the program. Then, hold down the control button and type "S." This action will turn the sound off and prevent a beep after every movement.

★ Apple II e

9. To begin programming, type "T" for timing. First there will be prompt for the command line, if on the line in which the command should appear, hit enter. The first "time" prompt is the time that the previous command will fade down. The second "time" prompt is the time that the next command will fade in. If they are to happen at the same rate, set them to an equal time. Regardless, these two actions will "cross fade" or happen simultaneously.
10. Next, type "L" for the level. This will allow another screen to appear with a set of numbers. The Ball State Planetarium only uses the first thirty-one. At this screen the prompt will again ask for you the command line number. If the cursor on the previous screen was left on the correct line number, simply hit enter. The next prompt will ask for the item number that you wish to adjust (1-31). After an item has been chosen, decide on a percentage. If the room lights are to be a dim red, choose number 29 and set at 40%.
11. After the time and level have been established, insert the cue information to assist in the de-bugging process. Type "I," then simply type in the reason for that command.

★ Apple II e

12. De-bugging the Apple II e program can be one while programming. First, turn the stars and star ball on. Then by typing "F" for fade, it is possible to observe the motion caused by each command line. Be Careful! If programming the star ball to move, do not toggle through the program without turning the motion off. Doing so will be very hard on the motors of the star ball.

NOTE: Before turning the system off, be sure to save the program!!! [hold down the shift key and type 6] The computer will not give a prompt to do so at any time!!

★ De-bugging

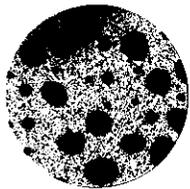
1. Place the loaded slide trays in the proper projector locations.
2. Turn the appropriate bit flags over to computer control by flipping the switch to green.
3. Turn on all the appropriate projectors and make sure each is set at the beginning of the show.
4. Turn on both computers. Open the file on the IBM and select the play cues command.
With the floppy in place, type play on the Apple II e and hit enter through the month and date page. (May also want to turn the sound off.)
5. Make sure all the power switches are on to the sound mixer and projector connection.
6. Turn on the amplifier.
7. Turn on and set the ADAT machine to the proper location (locate 1).
8. When ready, hit play on the ADAT machine and sit in the planetarium with note pad in hand.
9. Watch the show and determine all the places that need to be fixed.
10. After all the mistakes have been located, go back to programming mode and fix them.
11. Repeat this process until there are no mistakes in the program.



Appendix:

Extra Artwork:

1. The planets and galaxies were generated on the computer using Microsoft Paint.
The picture of the planet was then placed under a sheet of black construction paper with a small hole cut to just fit the planet image (called a mask).
2. The Milky Way and alien life form were simply drawn free hand by Jana Stockum (me).

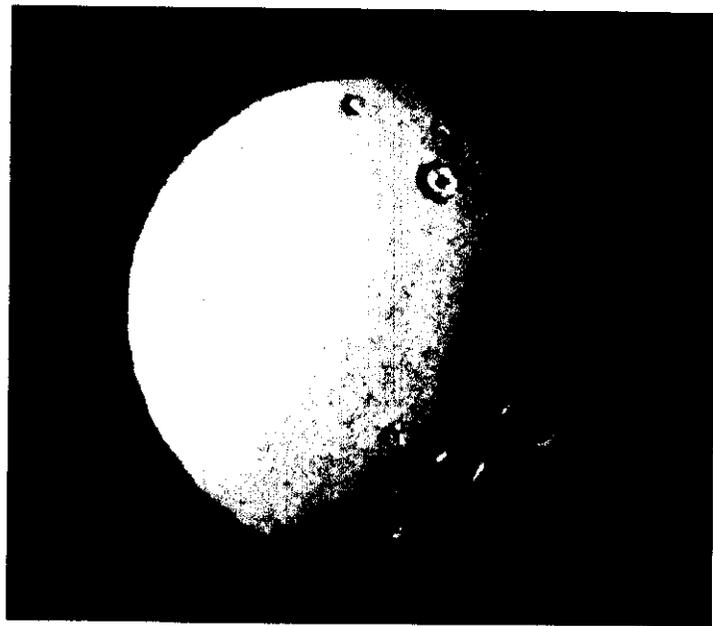


The
Milky Way

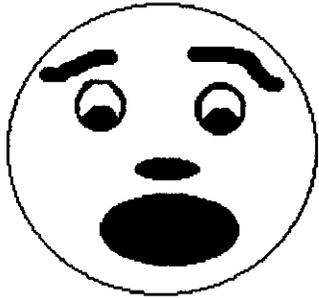


fake Galaxy





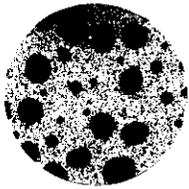
A moon



Mars

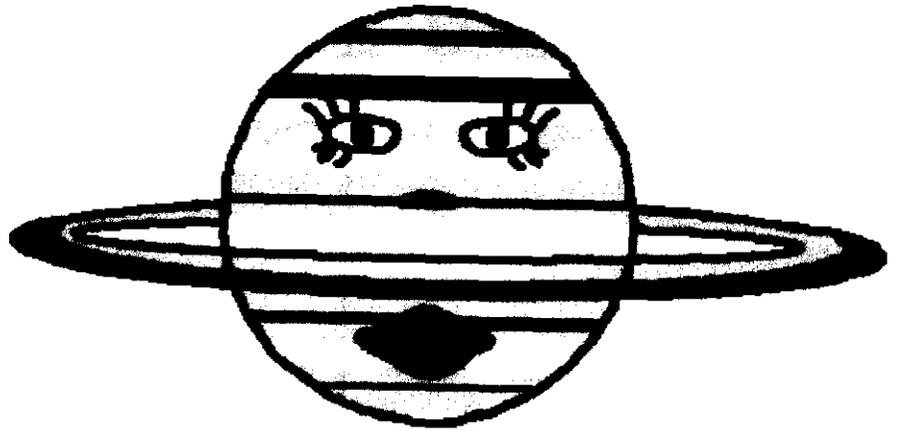


Uranus

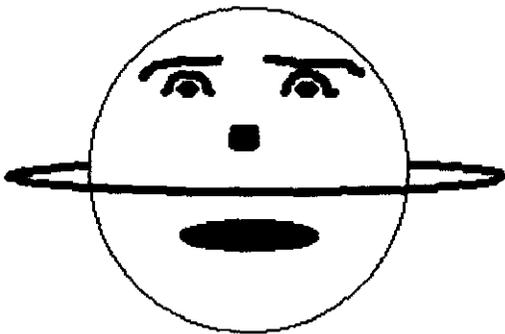


Jupiter





Saturn



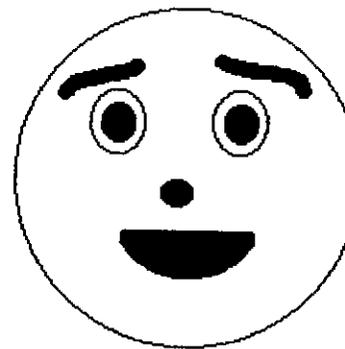
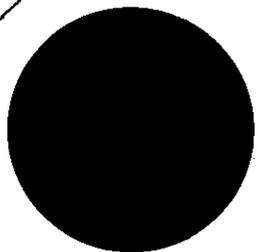
Neptune



Venus



Earth

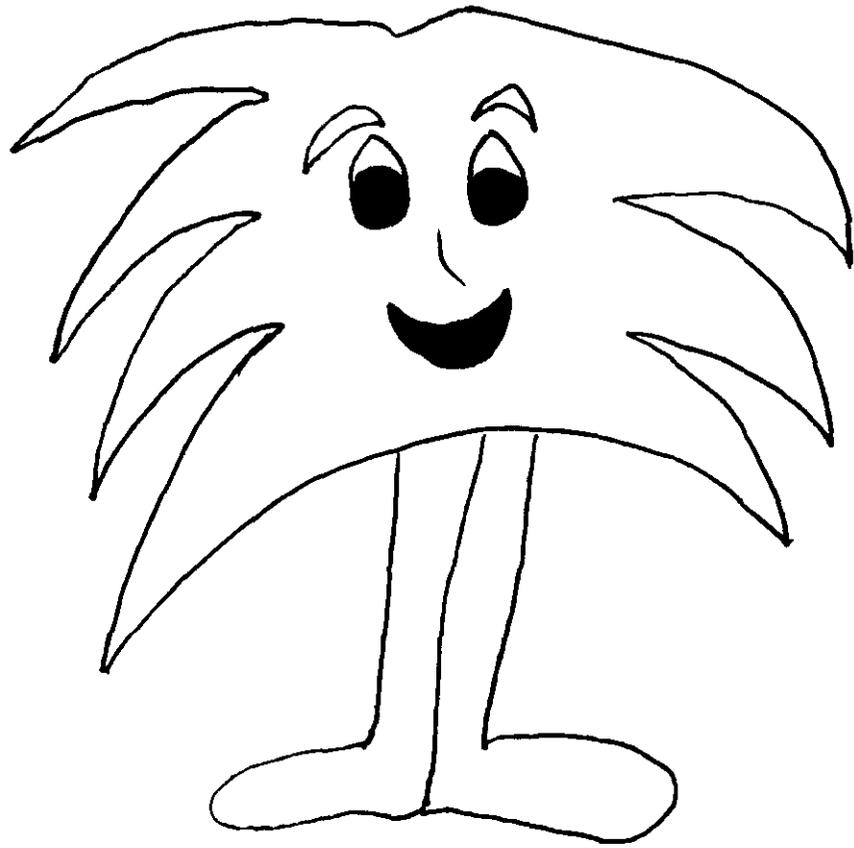


Mercur

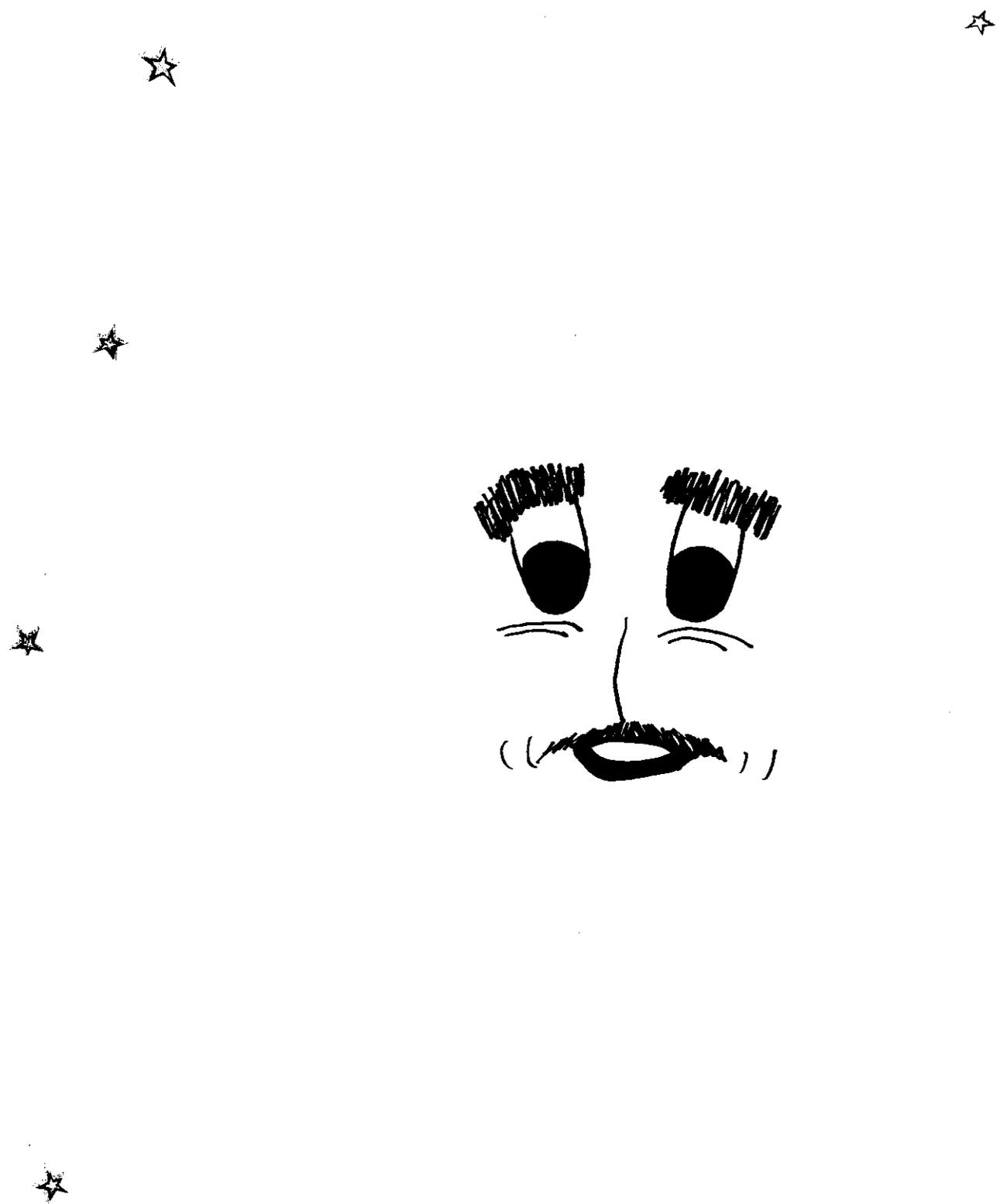


Pluto





Bogus Alien



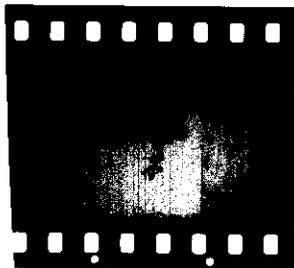
Milky Way



Appendix:

Determining the film type:

1. Kodalith film will produce a normal negative: after development all the dark areas will appear clear and all the clear areas appear black.
2. LPD4 film will produce a positive negative: after development all the dark areas will appear dark and the clear areas will appear clear.



LPD4

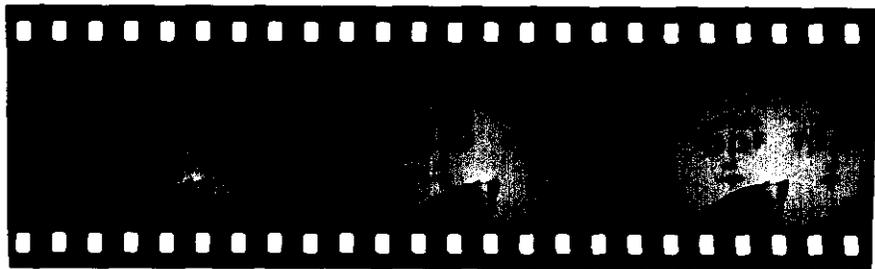
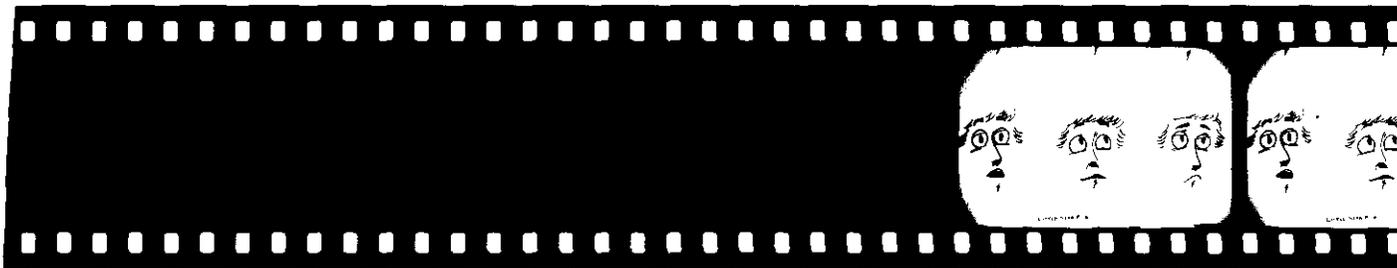


Kodalith

★ Appendix:

Determining the Exposure Time and Aperture Size:

1. Decide on the approximate distance between the camera and the image. Make an educated guess, or shoot a wide range of exposures for each aperture size on the camera for a trail roll of film. Use a small sheet of paper in the picture as a label of the exposure time and aperture size used for each frame. Develop the roll and see which combination works best. The goal is to have the black areas truly black and the clear areas truly clear.



Pleo

Goal
←

★ Appendix:

Developing Details:

General developing includes:

- A **developer** solution that chemically reacts to the film to create an image,
- A **stop bath** solution that stops the chemical reaction of the developer to prevent over-developed images,
- A **fixer** solution that attempts to make the image more permanent
- **And a water bath** that washes off all the chemicals.



Bibliography/Credits

Written and
Produced by
Laura Kyro

Music Composed and
Performed by
Mark C. Petersen,
Loch Ness Productions

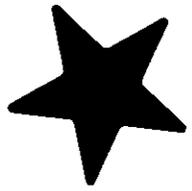
Artwork
Ed Koehler
Jana Stockum

Script Consultants
Roberta Landau
Richard Heuermann
John Wharton

Featuring The Talents Of
Gian Cavallini Pat Ball
Barron Winchester Beth Baur
Jeff Shankely Philip Keeler
Rosemary Watts J.J. Bowman
Harry Gorsuch

Produced for the Ball State Planetarium by
Jana Stockum

The Little Star That Could
Created at the McDonnell Star Theater
St. Louis Science Center
St. Louis, Missouri ©1986



The

End

