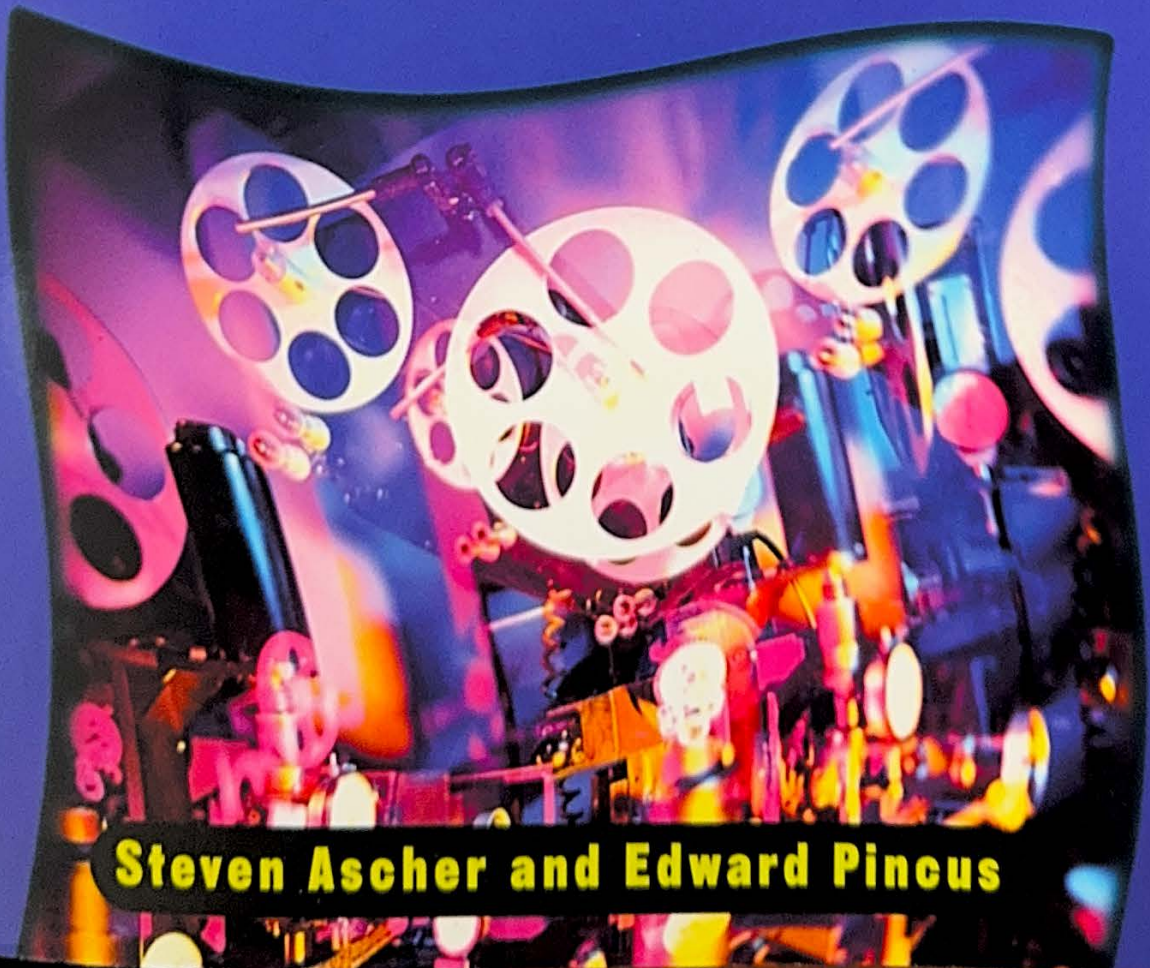


..... **COMPLETELY REVISED AND UPDATED**

THE FILMMAKER'S HANDBOOK

**A COMPREHENSIVE GUIDE FOR
THE DIGITAL AGE**



Steven Ascher and Edward Pincus

The Filmmaker's Handbook

A Comprehensive Guide for the Digital Age

.....
Steven Ascher
and
Edward Pincus
.....

Drawings by Carol Keller and Robert Brun
Original Photographs by Ted Spagna
and Stephen McCarthy

COMPLETELY REVISED AND UPDATED BY STEVEN ASCHER



A PLUME BOOK

PLUME

Published by the Penguin Group

Penguin Putnam Inc., 375 Hudson Street, New York, New York 10014, U.S.A.

Penguin Books Ltd, 27 Wrights Lane, London W8 5TZ, England

Penguin Books Australia Ltd, Ringwood, Victoria, Australia

Penguin Books Canada Ltd, 10 Alcorn Avenue, Toronto, Ontario, Canada M4V 3B2

Penguin Books (N.Z.) Ltd, 182-190 Wairau Road, Auckland 10, New Zealand

Penguin Books Ltd, Registered Offices: Harmondsworth, Middlesex, England

Published by Plume, a member of Penguin Putnam Inc.

First Printing, June, 1984

First Printing (revised edition), March, 1999

10 9 8 7

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REGISTERED TRADEMARK—MARCA REGISTRADA

LIBRARY OF CONGRESS CATALOGING-IN-PUBLICATION DATA:

Ascher, Steven.

The filmmaker's handbook : a comprehensive guide for the digital age / Steven Ascher and Edward Pincus. —Completely revised and updated.

p. cm.

Pincus' name appears first on the previous edition.

Includes bibliographical references and index.

ISBN 0-452-27957-7

1. Cinematography—Handbooks, manuals, etc. 2. Digital video—Handbooks, manuals, etc. 3. Motion pictures—Production and direction—Handbooks, manuals, etc.

I. Pincus, Edward. II. Title.

TR850.P54 1999

778.5'3—dc21

98-41665
CIP

Printed in the United States of America

Set in Janson Text

Designed by Jesse Cohen

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among several lenses. On all productions, it is very important to be vigilant about scrutinizing the image for defects that may come from lens problems. When shooting film, this means projecting the rushes on a good screen and watching carefully. When shooting video, it means viewing tapes on a high-quality monitor. Unfortunately, on many productions, footage is viewed on bad video monitors, low-resolution tape formats or editing systems that may mask lens problems.

Even expensive lenses vary in quality, which becomes apparent in use and can be checked by a lens technician. When you purchase a lens, if possible, take a few of the same model lens to a technician, since significant differences may exist from sample to sample. Small bubbles, which are often visible in a lens element, usually do not affect quality. Small surface scratches on used lenses do not affect performance, unless they are fairly numerous, in which case they lower image contrast. A chip in a lens element severely impairs the image by scattering light. All the controls on a lens should move smoothly, and nothing should rattle when you shake the lens. There should be no play in the iris diaphragm. A lens that has been hit hard should be tested by a technician.

LENS ABERRATIONS. Centuries before the invention of lenses, painters used a *camera obscura* (literally, "dark room"), which is a dark room with a small hole in one wall that looks out onto an exterior landscape. The landscape is projected on the opposite wall. Reduced in size, this concept is the pinhole (lensless) camera. Using a lens in a camera increases brightness and sharpness, but introduces aberrations in the image. *Lens aberrations* are distortions in the formation of the two-dimensional image by the lens. Common aberrations include: *curvature of field* (if the lens is perpendicular to a wall, either the edges *or* the center of the frame will be sharp but not *both*); *chromatic aberration* (light rays of different colors bend at different angles, decreasing image sharpness and creating a rainbowlike fringe on some objects); and *astigmatism* (vertical lines focus in a different plane than horizontal lines). *Geometric distortions* are most apparent when a grid is photographed. *Barrel distortion* causes the grid lines to bow away from the center; *pincushion distortion* will make them appear bowed in.

Nearly all aberrations, except distortion, are most apparent when the lens iris is wide open or nearly so and they limit lens sharpness (see below). As the iris is stopped down, the effect of the aberrations becomes less pronounced.

VIGNETTING. *Vignetting* is an optical phenomenon in which less light reaches the edge of the image than the center. Conventionally designed wide-angle lenses often show vignetting. *Retrofocus* wide-angle lenses increase the back focus distance to avoid considerable darkening of the edge of the image.

Vignetting, in the loose sense, refers to any loss of light toward the edges of the frame. This often occurs when lenses from a smaller format are used in a larger format (for example, 16mm lenses often do not completely *cover* the film area for super 16 or 35mm cameras). Vignetting is most apparent when the lens is wide open and the distance scale is set at infinity (and, in the case of zoom lenses, at the widest angle). If a lens shade or matte box cuts off picture area, it too is said "to vignette."