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In 2001 Michael Caporale purchased serial number one of Panasonic's new VariCam and became the first filmmaker to create a feature film, "Tattered Angel," using that camera. For over fifty years he has produced content on both film and HD video, primarily commercials and later feature films, and as such, brings his depth of experience to the writing of this book. As articles about him began to appear in trade magazines, he was hired by HD Expo to teach professional cinematographers transitioning from film to HD using the VariCam. Sponsored by Panasonic these workshops were known as VariCamps. In that capacity he trained such notable organizations as The Mayo Clinic, Lockheed Martin and National Geographic as they transitioned from film to HD.

Later Panasonic hired him as a contract consultant. Notably he was sent to Alaska to train the Versus crew filming the Iditarod race with their new P2 cameras as well as to New Zealand where he was the DIT for Mr.Taguchi of Panasonic, the inventor of the VariCam. In a shootout for the Director's Guild of New Zealand, against the Sony CineAlta and the Arriflex 35mm film camera BL IV, comparing the side-by-side footage, the Guild voted the VariCam the winner. Additionally, Michael created all the various scene files for Panasonic HD Cameras for nearly a decade.

Previously, in 1989 he founded the first all-digital edit facility in the Midwest, "Finis," and became one of only seven Beta test sites and the only non-CMX editor, for the soon to be released Avid, providing critical feedback to shape the interface of that system.

Later in 2002 he established his digital production company, "24P Digital Cinema," and working both as a cinematographer and a DIT on various independent feature films using

his VariCam. His book, "Hold the Roll" outlines in detail one such experience.

Regarding the cover photo:
Unless you had been a student in one of his seminars. one may well wonder why the cover features a meatball superimposed over a vectorscope. Caporale used the analogy of "making meatballs" effectively to explain the elusive and confusing process of accurately matching colors of a camera to a test chart. Read on and all will be made clear.

Forward

Do not be mistaken. This is a book on video aesthetics not on video engineering. Much has been written on video engineering and to the degree that you may require specific information in that regard, I would refer you to books such as "How Video Works" by Marcus Weise and Diana Weynand, the masterwork by Charles Poynton "Digital Video and HDTV" or for information specific to your camera, the Goodman's Guide series by Robert Goodman.

Technology has always been the root of aesthetic possibility. Cavemen could not draw on cave walls without the technology of fire to light their endeavors. Composers could not write musical notation, until such an instrument existed that could play what they had written. Thus, it was not until larger pipes were introduced to pipe organs facilitating deeper bass notes, that musical composition changed and a new aesthetic was born. The same type of change occurred when acrylic paints were introduced in the fifties. Because of the quick drying times and the use of masking tape, hard edge painting created a new abstract aesthetic. Technology is ever creating a new aesthetic.

Since the complexities of modern film and television production have always required a team of varied specialists to create this art form, the rapid technological advances of the last decade have underscored the need to have someone new on that team to inform and manage the technological innovations, particularly as they impact the aesthetic outcome. There can be no doubt that film has moved from the industrial age to the digital age and thus the DIT, Digital Imaging Technician, is born.

But even as the DIT has clearly arrived on the scene, they are, nevertheless, misunderstood. As unsure as we all are as to what a producer actually does, we all know exactly how they think. Not so with the DIT. If we only knew how DIT's think, might we better communicate with them? To that end this is a book about thinking, not doing. It is not an instruction manual for aspiring video engineers to learn engineering but for them, working engineers, and the entire production team to understand the DIT and begin thinking like them. Although it does describe some engineering procedures, rather it is a book about how to make decisions. In so far as making decisions involves understanding certain technical innovations as well as some procedures, I have included those that have not yet been written about extensively or could use some simplification to broaden communication. But for the most part, this book highlights the many considerations that factor in the decisions of a DIT.

Making technology accessible by keeping it transparent has been a key ingredient in the rapid growth of personal computing. Most people don't really want to know how the Internet works. They just want to push a button and jump on. The average consumer doesn't want to learn coding; they just want easy access to programming through a simplified user interface. Camera manufacturers have watched and learned, and the soaring sales of Prosumer cameras are a testament to their education in this regard. However, the by-product of this increase in the access to production media is the confusion created by mixing and matching the various components in the process, without the fundamental understanding of how each one functions. At this point the system breaks down. To solve these issues, it is not necessary to be a DIT, but to learn to think like one.

Introduction

It should be quite obvious to just about anyone who can differentiate a real potato from a Mr. Potato-Head that technological advances in the plastics industry have not improved the potato, even as a toy. The new, all plastic Mr. Potato-Head is a poor substitute for the free-form creativity released by sticking plastic ears, eyes, lips and noses into the wrong places on a real potato. As the technological advances of the past 25 years may have dramatically changed the methods we use to communicate, the content of our communication, our collective stories, grow. Unlike Mr. Potato-Head, the vast improvements made in digital imaging have opened new vistas that dramatically expand the quality of our media to validate the "suspension of disbelief" so vital to storytelling. We now sit at the center of the media fulcrum as the balance shifts from film to digital acquisition with every innovation.

A personal computer revolution that began by replacing the office typewriter progressed to topple entire industries, such as what has happened to typesetting with the introduction of desktop publishing. The home computer has changed how we get our mail, replaced the office copier and fax machine, made phone directories and yellow pages obsolete, and diminished the need for the public library as a reference resource. It provides cheaper phone service, an alternate news media, and has forever changed the retail industry, music distribution, all aspects of the photographic industry, as well as games and entertainment, television, politics, banking and personal finance. Automobiles are controlled and diagnosed by computers. Even courting, sex, and marriage have dramatically evolved as a result of computers. It would be quite safe to say that computing has rewoven the entire social fabric of our society while simultaneously cre-

ating whole new generations of do-it-yourselfers, kibitzers, scam artists, dreamers, bona-fide entrepreneurs and truly visionary artists.

The video industry, hardly immune, has become entirely dependent on advances in computing and it is hard to conceive of any recording or display device that can compete effectively in the marketplace today without employing the many emerging technologies. For video cameras, the advances of the last ten years have been most profound. Image quality that exceeds current broadcast standards is available to anyone at almost any pricepoint because of the advances in computer technology. Hours of video footage can now be stored on an SD card smaller than the "one thin mint" that wreaked havoc in Monty Python's "The Meaning of Life."

Whether this will spark a Renaissance of creativity, an explosion of information or a plague of mindless babble and a cacophony of visual noise (one must ask, "could it be any worse than reality TV?") can be much debated, but one thing is for certain. While redefining long-standing expectations associated with video cameras, these advances have effectively removed the barrier to entry formerly imposed by the high cost of ownership and the maintenance of cameras capable of professional imaging.

Acknowledging we all have pencils and pens and have all been trained in English, spelling and a variety of subjects, and while sharing a relatively universal experience in our short time on this planet, loving and suffering and growing together, few of us become writers, though we all have been made to try. A dearth of book reports and essays have produced little of interest, yet this is where it begins. School programs like "Power of the Pen" develop skills in

high school teens, but more importantly, passion. The same tools are available to all. The same words are available to all. Passion touches but a few.

At some point, any technology that supports human performance crosses a threshold that human performance cannot keep up with, yet alone exceed. We can use bigger words, or more words but we cannot improve Haiku. At times subtle and at times brash, communication remains an ephemeral component of human consciousness. Technology does little more than speed its availability. While we cannot exceed the technology we can improve our own performance.

To develop a passion for sports, children are given the same tools as the pros. Cost is not a factor. Even in a technology-dependent sport such as auto racing, the distinction between a street legal sports car and a high-performance racecar can be blurred because they both have crossed a threshold that requires serious experience to appreciate the difference. In the right hands, that difference can make a champion, but the technology that is shared is useful to all. A surge of power or the application of firm braking, applied at the right time can save lives. As a personal example, I have spent many fertile teen hours sweeping my father's family sedan into high-powered donuts on the icy parking lots of vacant movie theaters for the sheer thrill of it. While my father would hardly approve, the muscle memory and instinctive responses gleaned from those experiences have on multiple occasions saved my life and the integrity of my vehicle in weather-related, potential accidents. Practice is the key.

Certainly, technological events have carried video cameras over the threshold where they no longer present a barrier to effective communication on any level. The challenge re-

mains to understand the power generated by these advances and to harness it for its potential in supporting and sharing the human experience, by exposing ourselves to it, embracing it and practicing over and over.

Today cameras are being produced that far exceed the general level of experience to manage them. To make this technology available to more, particularly consumers, sophisticated technical features are boiled down to a few simple choices, thus eliminating the need for engineering support and the need to fully understand the technology behind it in order to use it. Just as the average consumer need not know the technology of today's automobile, it remains necessary to know the standard conventions such as the features and the location of the controls that access those features. Nevertheless, professionals must have a working knowledge of the intricacies of the vehicle they will push to its limits.

Now that every pre-pubescent child in America knows more about technology than their grandparents, teens share their personal video creations on myspace and YouTube; college-age kids create mini-masterpieces for the 48 hr Film Project or film festivals around the world, and all manner of adults produce videos for their own business. it's more important than ever that working professionals find the means to distinguish themselves creatively and technically. With that in mind, this book is written for those aspiring professionals whose thirst for knowledge and desire to excel leads them to explore alternate views of the technology that supports them.

I came to write this book rather circuitously. With a background as a painter/photographer turned filmmaker, in 1989 I had partnered with a group of people to open the

first all digital post-production facility in the Midwest, Finis. This background together with my experience in film combined to support events that ultimately brought me to the attention of Panasonic Broadcast and Television Systems and a contract as a consultant, providing a variety of services including that of workshop and seminar instructor. Through that association, it has been my privilege to work with many ardent and very technically skilled people including engineers, marketing execs and salespeople, distributors and other consultants, who speak a different tech language that can be an obstacle to many. In my capacity as an instructor, I was able to use my experience from both the worlds of film and video filtered through my art background to translate their tech talk to plain talk. Video engineering as explained by video engineers can be confusing. I hope you will find that my plain talk interpretation provides an alternate view that fosters understanding and simplifies complex procedures. It is my hope that this book will not only be read by aspiring DIT's but by the producers, directors and DP's who need to learn a way to communicate with them.

Keeping that in mind, many of the techniques I describe are largely of my own invention and are not necessarily endorsed by any manufacturer. There have been no sponsors who have participated in the financial support of the writing of this book. And the stories and anecdotes regarding the history and development of HD cameras are based on general industry mythology, as I am able to access it. Please remember this is, after all, only my opinion. Being a hired-hand at best, it may therefore be, as is most that is reported these days, a best guess that may or may not have any basis in fact. However, it has been read by a few very smart people before publication and that's probably more than who've read the "Patriot Act" before passing it. Many

creative minds, fervent risk-takers and well-backed investments by large and small companies alike have brought us to this point in our technical history and any omission on my part does not in any way diminish their contributions to the quest.

More importantly, this book was written at a specific place in time as the industry was in major transformation. Much has been added in technological advancements since then, but the principles involved that underly those advancements are really the true subject of this book. Therefore, do not be underwhelmed if the specifics of your new camera are not detailed here. This book is really designed to help you understand why and how it came to be, the problems it addressed and the benefits to you.

One thing is for certain. Reading this book does not make you a DIT. If I have fostered a passion in you to practice and learn more, so much the better. If I have encouraged dialogue between DIT's and their fellow professionals I will be very happy. If my ideas and suggestions provide meaningful solutions and help to working pros and aspiring students, then I will consider my time spent on this book successful.