Killer Camera Rigs That You Can Build

How to build your own camera cranes, car mounts, stabilizers, dollies, and more!

Third Edition

Dan Selakovich
Praise for the Previous Editions of *Killer Camera Rigs That You Can Build*

“*The singular beauty of this book is that Mr. Selakovich has successfully dedicated himself to producing clarity with every page.*”

—*Michael Ferris, Camera Operator/D.P. (Die Hard, Never Say Never Again)*

“To make great shots, you need great equipment. D.W. Griffith made his greatest shots with balloons before there were cranes. Francois Truffaut made his greatest tracking shots from a wheelchair. Then the Steadicam came along. Now we have Killer Camera Rigs That You Can Build. Buy the book, build it all, and make a great movie!”

—*Peter Medak, Director (The Ruling Class, Let Him Have It, Romeo Is Bleeding)*

“For filmmakers who like to shoot their films with a mobile camera, without spending a fortune on equipment rentals, this book is a great gift indeed. I highly recommend it for its clarity and common sense.”

—*Kris Malkiewicz, Cinematographer/Author (Cinematography, Film Lighting)*

“Dan has succeeded in making a nonintimidating how-to for camera rigs! No small feat! There are no excuses now! Even the smallest budget DV shoot can get ‘that shot.' Clearly, talent is one thing, but Dan has made it easier for you to have the tools to bring out your vision. I applaud the book—whatever it takes to tell the story and make great-looking film... on a budget or otherwise!”

—*Judy Marks, Cinematographer’s Agent*

“Sure, we’d like to shoot gorgeous panning shots like the Hollywood pros. But without expensive camera rigs, dollies, stabilizers, and other moviemaking niceties, we’re often left pushing each other around in our office chairs. However, if you’re handy with tools and can follow instructions, film teacher Dan Selakovich has another option: build your own rigs. In his book, Killer Camera Rigs That You Can Build, Selakovich offers step-by-step instructions and tons of useful photos for building your own cranes, dollies, mounts, and more—all from materials you can find at your local hardware store.”

—*Kelly Lunsford, MacWorld Magazine, March 2004*

“Many times in VideoCamera we discuss the use of tripods, dollies, booms, and other gadgets to make your shots steadier, more interesting, and even safer. But in many cases, the cost of the commercial versions of these things is prohibitive to the casual film maker or hobbyist.

Even our own Mike Jones, who is an accomplished filmmaker, has been known to have resorted to using a skateboard to zoom through the street off Sydney’s Newtown deftly holding onto his Canon XM-2 instead of hiring a dolly!

So when Killer Camera Rigs That You Can Build was mentioned in the Sony Vegas forum of Digital Media Net (no matter what NLE you use, there will be a forum there, trust me—see www.dmnforums.com) that discussed making your own gizmos, I just had to get a copy and see for myself.

When it turned up the following week, I was amazed. This A4 spiral bound book—it lays flat for ease of viewing when you are building these things—contains over 1300 step-by-step photographs to build everything from dollies, cranes, stabilizers, car mounts, and more, all from materials easily obtainable at your local hardware.

...The book contains over 300 pages, is a fun read as well, and highly recommended.”

—*David Hague, VideoCamera Australia Magazine, July 2004*

“...I can’t leave, however, without telling you about a new book written by Dan Selakovich that will save you infinite amounts of money on the production of your movie and will allow you to get some of the coolest shots you can imagine.

*Killer Camera Rigs That You Can Build* is a 340-page masterpiece of build-it-yourself camera tools that are both easy on the budget and easy to build. Selakovich’s instructions are fun and funny, and are accompanied by a ton of photographs that illustrate each project step by step. And what are the projects? Well, let’s see...you get the ‘Dark Passage Dolly,’ which allows you to make the kind of amazing shots that will have your friends asking, ‘How the hell did you do that?’ Then there’s the ‘Big Combo Crane,’ the ‘Killer's Kiss Crane,’ the ‘They Drive By Night Car Mount,’ ‘The Touch of Evil Cam’—are you sensing a theme here? Despite the silly noir-influenced names, each one of these projects looks like a winner.”

—*Rob Gregory-Browne, ScreenTalk Magazine, May/June 2004*
Without the unwavering support of these individuals, my life would be in shambles. This edition is dedicated to them:

My mom, Beth Selakovich. My dearest friends Bo Harwood and Paola Rauber. They have not only made my life better because they are in it, but this book would not have been possible without them.
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About Michael Ferris

Hey, Dan, why would you get someone nobody's ever heard of to write your foreword? Who the heck is Michael Ferris, anyway?

Yes, I was asked that. Fact is, Mike is a quite famous cinematographer in certain circles. Besides, even the most removed from the film industry have seen his work. Maybe you've seen these little, lesser known films: Die Hard, Water World, End of Days, Point of No Return, Internal Affairs, Back to the Future Part II, Colors, Never Say Never Again... I could go on and on. His credit list is as long as my arm. Yep, he knows his stuff. There isn't a piece of filmmaking equipment he hasn't had his hands on. A pretty good person to write a foreword on film equipment, don't you think?

But the main reason for asking him to write the foreword is his long collaboration with John Cassavetes. Cassavetes is arguably the father of American Independent film. (I saw Shadows 15 years after its release, and it still haunts me as a film to aspire to in my own work, but I know I'll never be that good.) It's the independent filmmaker I wrote this book for. Now we don't have to compromise a shot because we couldn't afford to rent that crane—or dolly or car mount or stabilizer—now we can own these things and have them handy whenever the filmmaking mood strikes us. I can't know this for sure, but I'd like to think John would have loved a book like this. Instead of spending $500 on a dolly rental, he could have bought more film. And after hearing some of Mike's marvelous stories about his work with Cassavetes, there was almost a perpetual lack of the stuff.

I met Mike Ferris through a mutual friend, Bo Harwood (another longtime Cassavetes collaborator). I have to tell you about that first meeting: it was at a convention here in Los Angeles where film manufacturers and suppliers show their wares. Bo and I met Mike at the front entrance, and before we made it 100 feet into the place, Mike had three job offers on three major motion pictures from friends and coworkers who happened to be at the convention (It seems that Mike knows everyone!). I'm not kidding—three offers of work inside of 10 minutes! Well, I was floored. Quite the first impression.

So that's why I asked Mike. Any more stupid questions?
Foreword by Michael Ferris

When Dan Selakovich asked me to write the introduction to a book about equipment and the technology of filmmaking, I asked him, “Why me?”

We had met but a few times and I was able to think readily of many who had more aptitude regarding the subject other than myself.

It is true that I have spent many years using the technological marvels available to the modern filmmaker. During this time it has been my job to relate the desires and instincts of many to the where, how, and when to use this sophisticated machinery. Still, I thought, am I justified in writing a foreword to a book dedicated solely to the technology of filmmaking?

Then Dan answered my question. And with his answer he made me understand instantly the yes of my own qualifications. He said, “Mike, you've worked with John Cassavetes. The man that started true independent film, the man that opened the door for the rest of us. And that's what this book is truly about, not just building camera rigs, but being free to create without a studio budget.”

I worked with John Cassavetes through the '70s and knew him until his death in February of 1989. I worked with him as cameraman on A Woman Under the Influence, The Killing of a Chinese Bookie, Mikey and Nicky, and Opening Night. I also worked on a film written by John and directed by his son Nick, called She's So Lovely (original title: She's De Lovely).

The man who authored this meticulous book was clearly inspired by John Cassavetes. It is a work of determined imagination, requiring perseverance and sacrifice, both common ingredients in any film John ever attempted.

As John's work continues to inspire people everywhere, Dan Selakovich has used his experience to reduce the disparity between affordable and high-cost filmmaking. This is something I think John would have deeply appreciated.

The difference between John and others was the difference between personal and professional lives. The clearly defined demarcation between work behavior and our private selves didn't exist for John. Whereas most of us leave our homes, arrive at work, and assume a public attitude, John shot his movies in his home. He used family and friends to play out the parts he wrote, and cajoled everyone in his life to help him render his ideas onto film. He was able to do this so successfully because he possessed the rarest combination of original talent and extraordinary personal humanity.

How does all this apply to the equipment used to make films?

In John's early days of picture-making, his camera platform and dolly moves were essentially limited to what his shoulders, legs, and back could withstand. His budgets limited the equipment he used. There is no question he would have enthusiastically incorporated into his projects the simple, useful techniques found in these pages. I can imagine him talking to Dan for hours (as he did with many of us) about the building and use of gear in this book for scripts he had written.
The singular beauty of this book is that Mr. Selakovich has successfully dedicated himself to producing clarity with every page. All aspects of creating the equipment it describes has been worked out in detail. The difficulties associated with visualizing specific construction and the agonies of realizing mistakes, then remeasuring and rebuilding are gone. Anyone who desires can quickly render easily obtained, inexpensive hardware into practical, reliable, innovative filmmaking equipment. This in turn will allow greater creativity for stories less restricted by physical limitations or time constraints.

I commend Dan for his pioneering solutions to the technical dilemmas facing filmmakers. I further salute you, the reader, for caring to search for ways to overcome the many obstacles to communication that bedevil those who would entertain, illuminate, inform, or connect with the human heart.

Like John Cassavetes, who seemed to reinvent the camera to interpret his own values, who recognized no technical boundaries and generated a visual language born out of pure stubborn necessity, declare war on anything that says the filmmaker can't.

This book not only says you can, it shows you how.

Michael Ferris
Malibu, California
Thank goodness for the digital video (DV) revolution. It has put filmmaking within reach of us poor folk (relatively speaking). The downside is that the things that hold and move the camera—dollies, stabilizers, cranes, and other necessities of movie making—are still darned expensive to rent. And forget purchasing (I don't know about you, but a grand for a boom arm is a little beyond my means). This book will change all that. I'm going to show you how to make this stuff. It really isn't hard. For the most part, if you can drill a hole, you can make most of the equipment in these pages. Really. And you don't even need a lot of room (for the first edition, I built everything in the book in my apartment kitchen). I've also tried to make the gear with the bits and pieces that are readily available at your local hardware store or sporting goods shop. The other great thing about DV cameras is their size. They're small and light, which means your camera rigs can be small as well. (The Dark Passage dolly has been used to do a dolly shot in the back seat of a car. Let's see Hollywood do that!) Smaller rigs mean more innovative shots in less time.

Most of the rigs in this book can be built for less than $100 as long as you follow my instructions! In other words, I've already made the costly mistakes for you. Not to mention the time wasted for that 100th trip back to the hardware store. Trust me, the price of this book will be saved in trial and error when you build your first crane. You may also notice that I use aluminum quite a bit in these rigs. Please don't panic! I know it's a metal, but it's a very soft one and relatively easy to work with. So don't worry, we'll be doing this step-by-step, and it's easy. Before building anything involving metal, please read the appendix, Working with Metal!

There are tons of new rigs in the third edition. Most are from requests of filmmakers who bought earlier editions; I do listen to you! Feel free to e-mail me about any questions, problems, rigs you'd like to see in future editions, or my favorite, praise about what a genius I am (wink, wink). You can reach me at dan@DVcameraRigs.com.

“Professional” rigs versus my rigs

First, I don't quite know what a professional rig is, but every now and then I'll hear that the rigs in these pages don't look professional (though they work as well or better than their professional counterparts!). In Evil Dead 2: Dead by Dawn, Director Sam Raimi bolted the camera to a 2×4 piece of lumber and ran through the woods with it. In The French Connection, cameraman Enrique Bravo was pushed around in a wheelchair used as a dolly for much of the picture. Hollywood lore is chock-full of stories like this.

I came up with my dolly design that uses in-line skate wheels around 1987. It never really caught on until the first edition of this book came out. Now you'll see some version of this dolly in use everywhere. One version I saw had six sets of wheels on each side (mine uses two sets, or rarely, three sets). When I asked the filmmaker why he decided to put so many, he answered, “this is a

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Killer Camera Rigs That You Can Build
professional dolly, though he couldn't explain why so many wheels were needed on a practical matter. My guess is, well, tradition. See, there's a dolly called a Fisher dolly that is pretty standard on Hollywood pictures. Sometimes a large group of skate wheels ganged together is needed to run this dolly on track. Why so many wheels? Because a Fisher dolly has a carrying weight of 445 pounds and a maximum load capacity of 900 pounds. This is one heavy piece of machinery, so it needs a lot of support from the wheels. A small platform dolly like the ones in this book carry 400 pounds max, depending on how big your camera operator is. Twelve sets of wheels are just not needed. But hey, it's your dolly. If you want to add them go right ahead!

This example is very typical, and every time I experience it, I'm reminded of a story my dad told me as a kid: A wife was cooking a roast when her husband asked why she cut the ends off of it before popping it into the oven. She replied, “Gee, I really don't know. That's what my mother always did.” Curiosity got the best of her, and she gave her mother a call. Her mother said, “I don't know. That's what my mother always did.” So the wife calls up her grandmother and asked why she always cut the ends off of the roast. The grandmother replied, “We could never afford a new pan, and the one I had was just a bit too small for the roast, so I cut the ends off to make it fit into the pan.” That's what tradition often is: a reason for something that no longer applies! The reason I'm sharing this with you is that many have used this book as a jumping off point to develop their own rigs to fit their specific needs. If you try to copy Hollywood for your 10 pound camera, you'll be overdoing it a bit, and wasting a lot of money that could be used for better sound for your movie!

“It doesn't look professional.” This comment is very rare, thank goodness, but I am always surprised to hear it. I personally don't care how a rig looks. I just want it to work right. After all, where would Sam Raimi be if he said, “We can't do that shot because that 2×4 doesn't look professional.” Fact is, I get about three e-mails a month from filmmakers who have purchased “professional” equipment that didn't work like it was designed to. Most often it is dolly track that created a bump in the move every time the wheels would go over a joined section of track. They ask me how to fix it. I'm always in the position of saying it can't be fixed. If a machined bit of track is wonky, it will always be wonky. My favorite track is plain ol' PVC pipe. It's cheap, it can be joined together with no bump at the joint, it's light, and it can be purchased just about anywhere. If you're in the middle of a shoot and rented only 15 feet of pro track and you need 20 feet, you're out of luck. PVC—just head for the nearest hardware store.

But as I said, I do listen to filmmakers, so you'll find “pro” versions of rigs and track in this new edition. They are harder to build, and don't work any better than the “lesser” designs, but if you want your shoot to look pro, have at it.

What you need to know before building anything in this book

TOOLS

Have you ever seen this really great show called The New Yankee Workshop? It's a PBS spin-off of This Old House. In it, Master Carpenter Norm Abram shows us how to build all sorts of finely crafted furniture and a plethora of other wood projects. The only bad part of the show is his amazing power tool collection.

Often I'll watch Norm work on a piece of equipment that only someone with a weekly show could afford: “Now we'll just move over to our laser cutter and glue unit....” Laser
cutter? Glue unit? Dang, Norm, it's just a coffee table. And where do I get one of those laser cutter combo glue units, anyway?

You won't have that frustration in this book. Although you'll need some basic tools for these projects, I will give you cheaper options than the best option. Would it be nice to have a drill press? Yes. Do you absolutely need it? No. Mostly. The “pro” dolly track and the Double Indemnity crane need some specialized tools, but in the end they aren't very costly. So at the beginning of each project there will be a tools list of what you'll need to make it.

MATERIALS

As I mentioned earlier, I've gone to some great (and sometimes very frustrating) lengths to build these rigs out of materials you can find in just about any city in America. Like the tools, there will be a list of the materials you'll need at the beginning of each project. And there is also a Photo Shopping List that has pictures and measurements of what you'll need. Don't know what a lock nut is? Just look at the photo. Easy. Also, read through the entire project before heading to the hardware store. There are things that are left up to you that take some consideration. For example, if you're getting a different size bolt than what I'm using, you just might need a different size drill bit to match that bolt.

While we're on the subject of buying, I found that the weird little out-of-the-way hardware stores were best for finding a lot of the little odd things. As far as the big chain home centers go, they are good for only the most common materials. Orchard Supply Hardware (in California) and Ace Hardware® have a much greater selection of odd and ends, at least in the Los Angeles area. Mostly, the small indie stores will have a much better selection, and are no more costly than the big boys.

“MAKE IT GROOVY” OPTIONS

Many of the projects you'll make have what I'll call a basic construction, and then add-ons to make it really cool. For instance, the Big Combo crane basic camera mount is nonmovable. The Make It Groovy option adds a movable bracket so you can tilt the camera up or down.

METRIC MEASUREMENTS

We here in America are a stubborn bunch. We've held on to those inches and feet much too long in my opinion. With that in mind, in this edition you filmmakers outside our U.S. borders will appreciate the metric measurements alongside those nasty inches. I've made every effort to make sure the conversions are correct, but hey, I live in America, so the conversions might not be exact. A millimeter here or there isn't going to make any difference, but in the rarest of cases. The only thing that comes to mind is the bolt that goes through the bearing for the Dark Passage dolly and the Shock Corridor stabilizer. If you can't find an 8 mm bolt, just get one that fits through the bearing with no wiggle room. Also, some countries might have no option but to go with the “pro” versions of things in the book, as in the cradle for the Double Indemnity crane. I've tried my best to make these out of materials available worldwide.

READ THIS OR GO BLIND!

Please, please read the safety instructions that come with your power tools—and follow them! And make damn sure you buy some safety glasses. All it takes is one metal chip in your eye to end your filmmaking career.
You can't make movies if you're blind! Seriously, don't be stupid. Buy and wear the damn glasses.

ABOUT THE RIG NAMES

I know. At first glance they may seem strange. The thing is, I'm a huge fan of film noir movies. All the rigs in this book are named after film noir pictures, mostly from the 1940s. I did this for my own amusement, but it has had a very welcome result: student filmmakers are actually watching these movies. Typically, I'm very unimpressed by movies made nowadays. Filmmakers never seemed to learn, or simply ignore, basic film grammar. These old movies are steeped in lessons for the modern filmmaker, and I hope you'll search some of them out. At the end of the book you'll find a list of all the movies for which the rigs are named, with the director and year they were made.