



# Contents

<b>Acknowledgements .....</b>	v
<b>Introduction .....</b>	xiii
Deep-Sky Video Astronomy	
<b>Chapter 1 Using Video for Astronomy .....</b>	1
1.1 The Image Sensor .....	2
1.2 Efficiency in Astrophotography .....	4
1.3 ProgressiveScan .....	4
1.4 Interlaced TV Images .....	4
1.5 Video Resolution .....	7
1.6 Low Light Performance .....	8
1.7 Hot Pixels .....	10
1.8 Color Versus Black and White .....	10
1.9 CCD Sizes and Image Scale .....	12
<b>Chapter 2 Cameras .....</b>	17
2.1 Image Accumulation Cameras .....	17
2.2 Cameras Modified for Astronomy .....	20
2.3 Basic Camera Features .....	20
2.4 Camera Control .....	23
2.5 Shutter Speed .....	23
2.6 Signal Gain Control .....	24
2.7 GammaSettings .....	25
2.8 Accumulation Mode .....	26
2.9 Video Cables and Connections .....	28

<b>Chapter 3</b>	<b>Video Capture.....</b>	31
3.1	Digitizing Video.....	31
3.2	Software Capture Tools .....	32
3.3	Aspect Ratio .....	33
3.4	Capture Resolution.....	35
3.5	Image Quality .....	37
3.6	RGB Color Spaces.....	37
3.7	Recording Directly to DVD.....	38
3.8	Bright Object Smearing in Videotape Recordings.....	39
3.9	8-Bit Grayscale Images .....	40
3.10	Understanding Capture Rates.....	41
3.11	Storage Mediums .....	43
3.12	File Sizes .....	44
<b>Chapter 4</b>	<b>At the Telescope .....</b>	47
4.1	Focal Reducers .....	47
4.2	Barlow Lens.....	48
4.3	Eyepiece Projection .....	50
4.4	Filters.....	51
4.5	Filter Selectors.....	51
4.6	Real-Time Video Observations.....	54
4.7	Creating a Video Portrait .....	55
4.8	Dark Frames .....	55
4.9	Flat Fields .....	56
4.10	Avoiding Dust Motes.....	59
4.11	Image Scale and Resolution .....	60
4.12	A Basic Plan for Your Imaging Session .....	61
4.13	Guiding and Tracking Corrections .....	66
4.14	How Many Images Should be Captured? .....	67
4.15	Framing Multiple Fields to Capture Large Objects .....	69
<b>Chapter 5</b>	<b>Initial Processing .....</b>	71
5.1	Software for Initial Processing of Video Files.....	71
5.2	Stacking with Registax Direct from an AVI File.....	73
5.3	Manually Stacking Images.....	78
<b>Chapter 6</b>	<b>Final Processing .....</b>	83
6.1	Calibrating Your Computer Monitor .....	84
6.2	Extracting the Detail.....	85
6.3	Vignette/Gradient Removal .....	90
6.4	Unsharp Masking .....	95
6.5	Making Color from Black and White Images .....	103
6.6	Color Balance.....	107
6.7	Adding a Luminance Channel to RGB .....	112
6.8	Making a Simulated Green Channel.....	113
6.9	Adjusting Color Shift in Single CCD Color Camera Images.....	117

6.10	Removing Artifacts .....	117
6.11	Blending MultiField Images.....	126
6.12	Printed Video Images .....	130
6.13	Publishing Images to a Website.....	132
<b>Chapter 7</b>	<b>Other Video Applications.....</b>	<b>133</b>
7.1	Lunar and Minor Planet Occultations .....	133
7.2	Astrometry .....	135
7.3	Supernova Searching.....	136
7.4	Meteor Observations.....	137
7.5	Video as a Guiding Tool .....	137
7.6	Manual Guiding.....	140
7.7	Automatic Guiding.....	141
7.8	Video Finderscope .....	142
7.9	Video Polar Alignment .....	144
7.10	Collimating with Video .....	144
7.11	Detecting Faint Planetary Moons .....	145
7.12	Near Infrared: Imaging the Unseen .....	146
<b>Chapter 8</b>	<b>The Gallery .....</b>	<b>149</b>
8.1	Suburban Light-Polluted Skies .....	149
8.2	Dark Country Skies .....	160
<b>Glossary .....</b>	<b>173</b>	
<b>For Reference and Further Reading .....</b>	<b>179</b>	
Internet Sites of Interest .....	179	
<b>Index.....</b>	<b>181</b>	