

Astrophotography Runbook

1. Place vibration suppression pads on ground
2. Set up Tripod
3. Level & align tripod to Magnetic North with Compass
4. Attach Mount to Tripod
5. Check Mount bubble is level
6. Attach Counterweight Bar to Mount
7. Attach Telescope to Mount
8. Attach Counterweight to Counterweight Bar
9. Attach Finder Scope to Telescope
10. Connect SkySync GPS to Mount AUX
11. Connect Nexstar+ to SkySync GPS AUX
12. Connect Server Box to Nextstar+
13. Connect Server Box to Ethernet
14. Position Server Box GPS Receiver Antenna
15. Connect Focus Controller to Focus Motor on Telescope
16. Connect Focus Controller to Server Box
17. Attach Imaging Train to Telescope
18. Ensure that Imaging Train will not obstruct Finder Scope
19. Ensure that Imaging Train cannot collide with mount when pointing close to the zenith.
20. Balance DEC & RA Telescope Axes with Counterweight and Losmandy Mount Plate Position
21. Connect Server Box to Imaging Train
22. Connect Guide Camera ST4 port to Mount Auto Guider port
23. Connect Power 1 12V to Server Box (USB Hub)
24. Connect Power 2 5V to Server Box (Raspberry Pi4-4GB)
25. Connect Power 3 12V to Focus Controller
26. Connect Power 4 12V to Mount
27. Connect Power 5 12V to Dew Controller on Telescope
28. Connect Power 6 12V to Imaging Train Cooler
29. Turn on Power Source (Nevada PSU or Tracer LiFePO4 Battery)
30. Connect Imaging Train to OTG Tablet port
31. Turn off lights, set up PowerTank red LED and site safety tripod red LED lights
32. Adjust Dew Heater Controller according to reported Temperature and Dew Point
33. Perform Manual Focus via Focus Controller buttons with ASICap on Tablet
34. Confirm Red Dot Finder Scope and ASICap bullseye are similarly aligned
35. Attach Polar Finder Alignment Scope to Mount
36. Loosen Alt/Az Polar Alignment Nuts & Controls
37. Confirm Polaris Position with respect to North Celestial Pole via Server Box astropanel
38. Perform Polar Alignment with Polar Scope
39. Confirm and Adjust Polar Alignment with ASICap bullseye
40. Secure Alt/AZ Polar Alignment Nuts & Controls
41. Remove Polar Alignment Scope from Mount
42. Remove Azimuth Controls for extra clearance when pointing near zenith.
43. Confirm Time, Latitude and Longitude via Server Box gpspanel
44. Set time or acquire GPS from SkySync
45. Set/check Mount Latitude and Longitude or acquire GPS from SkySync
46. Perform Two Star Alignment with Finder Scope and ASICap bullseye
47. Add Calibration Stars (x4) with Finder Scope and ASICap bullseye
48. Turn off ASICap

49. Connect Imaging Train to Server Box
50. Go Inside
51. Start Kstars
52. Start Ekos
53. Check Luminance Filter Selected
54. Start Imaging Camera Cooling and wait until stable (-5°C)
55. Perform Auto Focus (autofocus fails, fiddle with settings, end up manually focusing)
56. Slew to a good position
57. Plate Solve and Sync Mount to Complete Plate Solved Alignment
58. Slew to Target
59. Perform Auto Focus
60. Check Guide Settings (Gain, Exposure, Binning, Subframe, Auto Star)
61. Plate Solve and Sync Mount once more
62. Slew to Target again if necessary
63. Initiate Guiding
64. Check Imaging Camera Gain
65. Check Weather forecast
66. Check Imaging Camera Exposure Time and Number of Subs according to weather forecast
67. Check Guide accuracy requirements
68. Check Imaging Camera cooler accuracy requirements
69. Check Auto Focus requirements during capture session
70. Setup Luminance, Red, Green, Blue, H-Alpha, O-III & S-II capture sessions
71. Check Guiding is behaving
72. Begin Image Acquisitions
73. Monitor Guiding and incoming FITS Captures for acceptable results
74. Slew to Zenith Position (Counterweight Bar horizontal, telescope up)
75. Go Outside
76. Place Cover on Telescope
77. Take 30 Dark Frames (same Gain, same Exposure, any filter)
78. Take 30 Bias Frames (same Gain, minimal Exposure, any filter)
79. Connect Flats Generator to Server Box
80. Remove Cover from Telescope, place Flats Generator on Telescope Dew Shield
81. Take 30 Light Frames (same Gain, auto-Exposure to mid-ADU level, repeat for all filters)
82. Begin Pack up
83. Shutdown Server Box gracefully
84. Turn off Power Source (Nevada PSU or Tracer LiFePO4 Battery)
85. Remove all Cables
86. Remove Finder Scope from Telescope
87. Detach Imaging Train from Telescope
88. Remove Focus Controller
89. Remove Server Box
90. Detach Telescope from Mount
91. Remove Counterweight from Counterweight Bar
92. Detach Counterweight Bar from Mount
93. Detach SkySync from Mount
94. Detach Nexstar+ from SkySync
95. Detach Mount from Tripod
96. Remove Tripod
97. Remove Vibration suppression pads
98. Look for stray caps
99. Check optics for Dew accumulation
100. Seal optics with caps until next time