Hack 30. Run a Messier Marathon

Look over Robert's shoulder as he tries to log all 110 Messier Objects in one night.

No matter how carefully you prepare, the reality of Marathon night is likely to be different from what you expected. As the military strategist Karl von Clausewitz observed, no battle plan survives first contact with the enemy. Few Messier Marathons are any different. In this hack, we'll try to give you a flavor for the reality of running a Messier Marathon.

Robert ran his first (and, to date, only) Messier Marathon on 1/2 April 2003 from an observing site at a private lodge near the Blue Ridge Parkway in southern Virginia. Two other club members, Steve Childers and Paul Jones, participated in this First Annual Winston-Salem Astronomical League Messier Marathon. None of us had done a Messier Marathon previously. Steve used his 10" Dob, with a 27mm Panoptic and 14mm and 10.5mm Pentax XL eyepieces. Paul used his binocular and his 8" SCT with 32mm Tele Vue Ploessl and 14mm Pentax XL eyepieces. Robert used his binocular and his 10" Dob with 14mm and 40mm Pentax XL eyepieces and a 2X Barlow.

The site was quite dark for the Eastern U.S., about Bortle 3.5 (http:// cleardarksky.com/csk). The horizons were excellent from E through NNW, but obstructed from 2° to as much as 34° by the lodge itself and a treeline from N through NE. The main horizon obstruction was nearly dead north, and if you have to have an obstruction during a Messier Marathon, that's where you want it. Weather conditions were excellent.

Based on that experience, here are Robert's comments and advice about running your own Marathon.

2.21.1. Final Preparations (Afternoon19:30)

Make every effort to arrive at the observing site by late afternoon. Unpack, check your gear, and choose where to set up. If the site is secure, set up your scope now. If local lights are likely to be a problem, set up to avoid them as much as possible. There was one streetlight located a couple hundred feet west of our observing site, but no other local lights. We set up our scopes in line with another phone pole and our vehicles to block the streetlight.

Take a nap until dinner time. If you haven't already done so, set up your scope no later than 18:30 so that it will be cooled down and ready. Plan dinner to end no later than 19:15, including clean up. From 19:15 to 19:30, do final equipment preparation, get your charts out and ready, and so on. Check your finder alignment on Sirius in the south or Capella high in the northwest sky. Put your low-power, wide-field eyepiece in the focuser Robert used a 40mm Pentax XL that provides a 2° true field in his 10" Doband get it focused. Take a deep breath.

2.21.2. Group 1: Early Evening Objects (19:3020:30)

There's no dipping your toe in the water for a Messier Marathon. You have to hit the ground running to bag all or even most of the early evening group, shown in Table 2-8. Robert used an unconventional sequence for this group, basing it on the order the objects become visible in the growing darkness. Some of these objects are bright and easy, but several are dim and fiendishly difficult to find and see in the evening twilight.

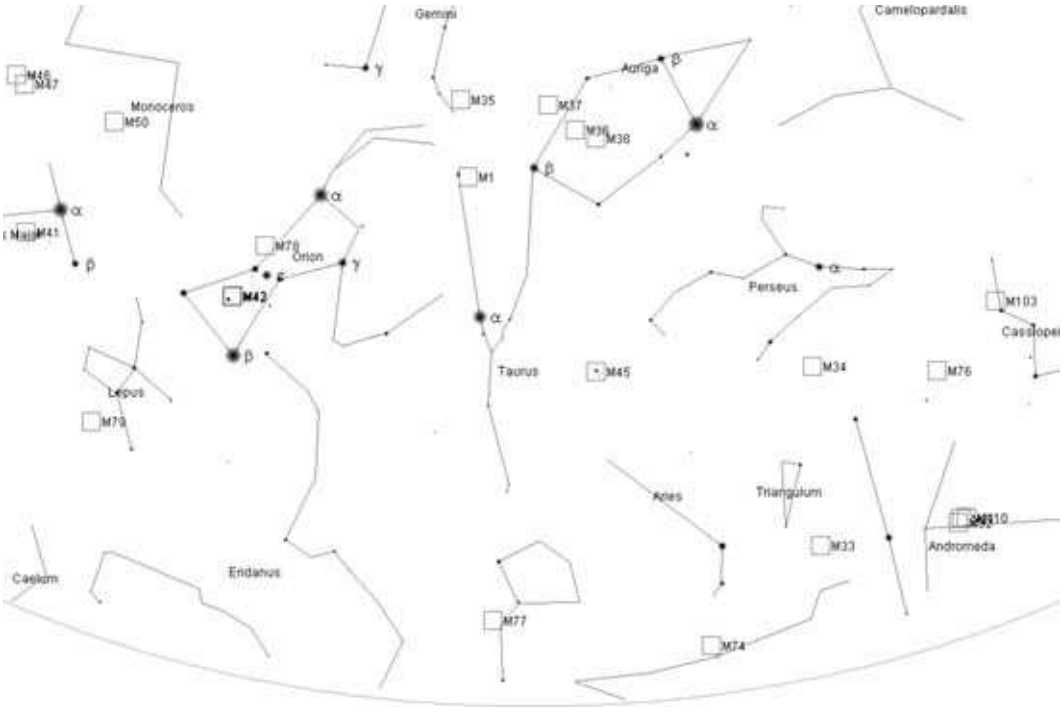
Table 2-8. Early evening objects

Seq #	Time	Object	Seq #	Time	Object

1	19:40	M45	9	19:57	M77
2	19:42	M42	10	19:59	M33
3	19:42	M43	11	20:00	M34
4	19:46	M52	12	20:03	M32
5	19:46	M103	13	20:03	M110
6	19:48	M31	14	20:06	M79
7	19:50	M78	8	missed	M74
8	missed	M74	15	20:28	M76

Figure 2-32 shows the western horizon at the start of the Marathon. The Pleiades (M45) is the first object to appear as the sky darkens, and it should be an easy naked eye and binocular object within a few minutes after 19:30. By the time you've logged M45, Orion's belt should be visible. Use your finder to center Orion's sword and get M42 and M43 in the eyepiece at low power. By that time, the open clusters M52 and M103 in Cassiopeia should be relatively easy binocular objects. Log them, and then go for M31 with your binocular. If you can't get M31 with your binocular, put your scope on it with moderate power. You may also be able to see M32. If so, log it, but don't waste time trying for M110. The sky isn't dark enough at that point. It's also worth a quick look at this point to see if M33 is visible, but don't waste much time on it. Once you have M31, move back to Orion and place your Telrad or finder to locate M78, just off Orion's belt near the line from Alnitak to Betelgeuse. M78 should be visible in your eyepiece at moderate power.

Figure 2-32. The western horizon as the Marathon begins



M74 is by far the hardest of this group, particular for late March or April Marathons. It's a dim galaxy that's very near the horizon while the evening twilight is still bright. Your best chance is to use your optical finder to follow the line from Hamal (α-Ari, 2.0m) to Sharatan (β-Ari, 2.6m) to the

3.6m star η-Psc and then move your scope about 80 arcminutes ENE to center M74. Once you are certain M74 is centered in the eyepiece, change to a moderate-to high-power eyepiece to bring it out against the bright background. (Robert was unable to see M74 even at high power, despite being certain it was in the eyepiece.) Spend at most five minutes looking for M74. If you can't get it, move along to the other objects to make sure you get them before they set.

M77 is the next object. It's a small galaxy with relatively high surface brightness that's easy when it's at high altitude, but difficult on Marathon night because it's only at 6° or so altitude when you begin searching for it. Fortunately, M77 is located in the same eyepiece field as the 4th magnitude star δ-Cet, which makes it relatively easy to locate. Use moderate to high power to bring out M77 against the sky background.

By now, it's nearly 20:00, and the sky has darkened. If you haven't already logged M74, give it one last try, but don't waste too much time on it. If you miss it, you'll be in good company. If you haven't logged M33, give it another try. M33 may be easier with your binocular than with your scope. Then use your binocular to pick up the open cluster M34 in Perseus. Once you have M34, return to your scope, and locate M31 again. By this time, it's dark enough to see M31's companion galaxies, M32 and M110. Log those, and move on to Lepus, where the globular cluster M79 is setting rapidly. Finally, use your Telrad and finder to get the planetary nebula M76 in your eyepiece. Use moderate to high power to verify M76, and log it.

After one hour, you've located, viewed, and logged as many as 15 objects. If your count is lower, don't be discouraged. Most Marathoners fail to bag M74, particular if the Marathon is at a late date, and many miss half a dozen or more of the very difficult Early Evening group. Even if you've missed half a dozen of this group, you still have a good chance to break 100 for the Marathon.

Robert found when he attempted to bag M52 and M103 that they were behind the tree line. That wasn't a major problem. He took his binocular and jogged 25 yards or so to a position where they were unobstructed, logging them and M31 for good measure. After he logged M78 and spent a few minutes missing M74, he bagged M77 and logged M33 and M34 with his binocular.

He then attempted to get M31 in the scope so that he could log M32 and M110. Uh-oh. By that time, the Andromeda group had sunk so low that his vehicle was blocking the view. Oh, well. Nothing for it but to pick up the scope and move it. He carried his scope far enough from his vehicle to give it a clear view of the Andromeda group without looking straight into the now-unobstructed streetlight. After a bad moment failing to see M32 or M110, he put on more power and was able to see M32 and M110. Whew. He carried the scope back to its original screened position, picked up M79, tried and failed again to log M74, and finally picked up M76.

It wasn't until later that Robert realized that he could have moved his vehicle temporarily instead of moving the scope. Duh. The real point here is that you need to remain flexible, particularly if you have horizon issues. Don't be afraid to move your scope, change your sequence, or do whatever it takes to maximize the number of objects you bag.

2.21.3. Group 2: MidEvening Objects (20:3021:00)

By 20:30, the big early push is over, and it's time to start work on the mid-evening group of 21

objects, shown in Table 2-9. Most of this group are open clusters you can bag with your binocular. Begin by locating the supernova remnant M1, which is near the 3rd magnitude star 123 ζ-Tau. With M1 logged, move on to the open clusters M50 in Monoceros; M46, M47, and M93 in Puppis; M41 in Canis Major; M44 and M67 in Cancer; M48 in Hydra; M35 in Gemini; and M36, M37, and M38 in Auriga. Using your binocular from a good dark site, these objects should take you at most a minute or two each to locate and log.

Return to your scope and locate the galaxy pair M65/M66 in Leo, both of which fit in an eyepiece field (along with the galaxy NGC 3628; we wonder how Messier missed that one). Locating these galaxies should take only a minute or two using your Telrad. Once you've logged M65/M66, locate the 5.5m star 52 Leo on the line from Chort to Regulus, and use it as a guidepost to the Messier galaxy trio M95, M96, and M105. With Leo cleared, move along to Canes Venatici to pick up the globular clusters M3 and M53, and the galaxy M64.

Table 2-9. Mid-evening objects

Seq #	Time	Object	Seq #	Time	Object
16	20:35	M1	27	20:46	M36
17	20:36	M50	28	20:46	M38
18	20:37	M46	29	20:50	M65
19	20:37	M47	30	20:50	M66
20	20:38	M41	31	20:55	M95
21	20:40	M93	32	20:55	M96
22	20:41	M44	33	20:55	M105
23	20:42	M67	34	20:58	M3
24	20:43	M48	35	21:02	M53
25	20:45	M35	36	21:05	M64
26	20:46	M37			

About 90 minutes of the Marathon is complete, and you've now logged as many as 36 objects. That's nearly one-third of the total. Robert's count was 35 at this point, and he was feeling a lot better about his prospects for the rest of the night.

2.21.4. Break (21:0021:30)

We scheduled a half-hour break from 21:00 to 21:30, just to relax a bit after the hectic first 90 minutes and think about what was to come. Paul and Robert were only five minutes or so behind our planned schedule at this point, so we knocked off for a half-hour to drink coffee, discuss what we'd done, and talk about the upcoming group. Steve had had some equipment problems, and so was a bit behind schedule. If you're behind schedule at this point, use the time to catch up, but try to break for at least a few minutes for coffee and to warm up.

2.21.5. Group 3: Late Evening Objects (21:30Midnight)

The late evening group comprises the 33 objects shown in Table 2-10, most of them galaxies in Ursa Major, Virgo, and Coma Berenices. Clear M51 (the famous Whirlpool Galaxy in Canes Venatici) first, and then log all of the objects in Ursa Major, most of which are relatively easy to find and see.

Table 2-10. Late evening objects

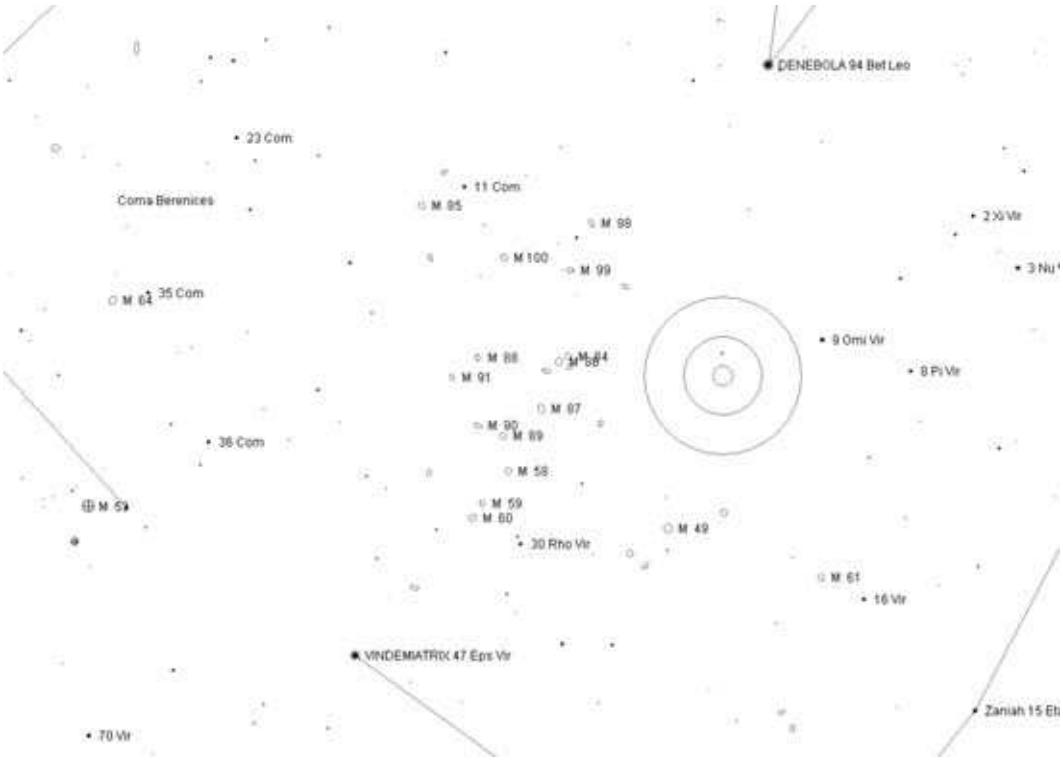
Seq #	Time	Object	Seq #	Time	Object
37	21:30	M51	54	23:05	M58
38	21:35	M101/102	55	23:05	M59
39	21:40	M106	56	23:05	M60
40	21:45	M40	57	23:07	M89
41	21:50	M81	58	23:07	M90
42	21:50	M82	59	23:16	M91
43	21:55	M97	60	23:16	M88
44	21:55	M108	61	23:23	M87
45	22:00	M109	62	23:25	M84
46	22:05	M102	63	23:25	M86
47	22:08	M63	64	23:30	M98
48	22:12	M94	65	23:30	M99
49	22:15	M68	66	23:32	M100
50	22:20	M83	67	23:40	M85
51	22:37	M104	68	23:48	M13
52	22:53	M61	69	23:50	M92
53	23:00	M49			

With the CVn and UMa objects logged, move on to the Coma-Virgo Clutter, shown in Figure 2-33. The clutter contains scores of bright galaxies in an area of sky you can cover with your hand held at arm's length. If you've practiced the Coma-Virgo Messier galaxies several times and have detailed charts at hand, you should be able to get through the Coma-Virgo Clutter in half an hour or less. Otherwise, you're doomed.

Robert ran the Coma-Virgo Clutter four times; three times during the practice session the preceding night, and once on Marathon night. He used a different sequence for each run, starting once from the Denebola end, twice from the Vindemiatrix end, and once from both ends toward the center. So much for planning. But by Marathon night, he knew the Coma-Virgo Clutter so well he could almost do it in his sleep.

The trick to negotiating Coma-Virgo is to use a wide-field eyepiece to "galaxy hop" from one cluster of Messier galaxies to the next. Although there are scores of other galaxies visible, the Messier galaxies are generally larger and brighter than the others, and so they can be used as guideposts. By knowing the true field of view of your eyepiece and comparing that field with your detailed charts, you can galaxy hop confidently, knowing that you've correctly identified the brighter galaxies in your field of view [Hack #50][Hack #57].

Figure 2-33. The Coma-Virgo Clutter (4° Telrad circle shown for comparison)



It's a mistake to use too much aperture in Coma-Virgo, particularly from a very dark site. With an 8" or 10" instrument, the Messier galaxies stand out. With a large instrument, so many non-Messier galaxies are visible that it's difficult to identify the Messier galaxies in all the clutter.

Once you complete the Coma-Virgo Clutter, move on to the two bright globular clusters in Hercules, M13 and M92, both of which are relatively easy binocular objects. M13 is by far the most impressive globular cluster visible from northern latitudes. Were it not for M13, M92 would be recognized as a magnificent globular in its own right, but the proximity of M13 means M92 gets little attention.

It's now about midnight. In 4.5 hours of work (maybe with a short break) you've logged as many as 69 objects, or nearly two-thirds of the total. At this point, Robert was hanging in there with a total of 68 objects, having logged all of the objects except M74 from the first group. Paul was a perfect 69 for 69, and Steve was sitting at 63. Things were looking good.

Before the Marathon, Paul and Robertboth experienced observers but newbie Marathonershad discussed what numbers they expected and hoped to make. Both agreed that they'd be satisfied with a total of 75 objects for the night and delighted with 90. Steve, with less experience, said he'd be satisfied with 50 objects and delighted with 70. So, as it turned out, by midnight and with hours yet to go, all of us were within easy reach of achieving our hoped-for totals. We hadn't anticipated that by midnight each of us would already be able to declare our Marathon a personal success.

2.21.6. Nap (Midnight02:00)

At midnight, it's time for a nap. Seriously. You've been working hard for hours, and are probably chilled. Many of the remaining objects aren't up yet, and those that are will be up for a long time. Take a couple of hours off to rest and warm up. It'll make the rest of the night go a lot easier, at least in theory.

We adjourned to the lodge, lit the fire that we'd pre-laid in the fireplace, made some hot cocoa and microwave popcorn, chatted for a few minutes, and then zonked out. We made sure to set two alarm clocks, afraid that otherwise we'd wake up after sunrise. Paul and Robert woke up on time. They tried to rouse Steve a couple times, but he didn't move. They left him, figuring he was dead, and went back to work on the next group of objects. A while later, Steve staggered out of the lodge and went back to work, already 15 minutes or so behind schedule and muttering something about having friends like us....

2.21.7. Group 4: Early Morning Objects (02:0004:00)

You have a long run in front of you36 objects in two hours, nearly one object every three minutes. At this point, despite our naps, all of us were tired and discouraged at the magnitude of the task remaining. At 2:00 in the morning, things look bleak, and standing in a field in the dark with a cold breeze blowing doesn't help matters. You may find yourself wondering, as we did, why you are doing this to yourself [Hack #1].

Robert needed some successes to get the ball rolling, so he abandoned his planned sequence and schedule to log some easy, familiar objects. He used his binocular to bag the large, bright globular clusters M10 and M12 in Ophiuchus, moved on to the binocular globs M4 and M80 in Scorpius, and then used his scope to bag the planetary nebula M57 and the glob M56 in Lyra. With six objects logged in 20 minutes, Robert had reached 74 objects, and things weren't looking nearly as bleak. He was right on schedule, with only 30 objects left to go in the early morning group, shown in Table 2-11.

Table 2-11. Early morning objects

Seq #	Time	Object	Seq #	Time	Object
70	2:05	M10	88	3:26	M11
71	2:06	M12	89	3:27	M16
72	2:08	M4	90	3:28	M17
73	2:10	M80	91	3:30	M18
74	2:18	M57	92	3:37	M26
75	2:20	M56	93	3:40	M8
76	2:25	M5	94	3:41	M23
77	2:30	M19	95	3:42	M24
78	2:35	M62	96	3:42	M25
79	2:42	M6	97	3:43	M22
80	2:42	M7	98	3:45	M28
81	2:44	M107	99	3:52	M20
82	2:47	M9	100	3:53	M21

83	2:50	M14	101	3:56	M54
84	3:04	M27	102	3:57	M69
85	3:07	M29	103	3:58	M70
86	3:15	M71	104	4:03	M55
87	3:21	M39	105	4:09	M75

By shortly after 4:00, we'd all finished logging all 36 objects in this group. We were worn out and cold, so we took a short break to get some coffee and warm up a bit. With that done, we staggered back to our scopes and prepared for the closing stage of the Marathon.

2.21.8. Group 5: Final Objects (04:00Dawn)

The final five objects, shown in Table 2-12, are, if anything, harder than the early evening objects. The eastern sky is still dark, but it won't be long before it begins to brighten, and the final objects are barely above the horizon. Robert bagged the glob M15 first, just off 2nd magnitude Enif in Pegasus. We were all so punch-drunk by that time that when Robert and Steve mentioned logging M15, Paul said, "What do you mean you logged M15? It isn't up yet." Robert, almost convinced despite himself, replied, "Well, what's that big, bright glob near Enif?" After a few moments, Paul apologized, saying that he'd hopped the wrong direction with his equatorial mount, moving it below the horizon instead of above it. He wasn't the only one confused by then.

Table 2-12. Final objects

Seq #	Time	Object	Seq #	Time	Object
106	4:22	M15	109	4:50	M73
107	4:33	M2	110	missed	M30
108	4:46	M72			

M2, a big, bright globular cluster in Aquarius was next. It was harder to locate than M15, but Robert was eventually able to hop to it from 3rd magnitude Sadalsuud (22 β-Aqr). At that point, he thought he'd probably gotten his last object of the Marathon, and was about to settle for a final score of 106 objects. But he persisted in looking for the small, dim glob M72 in Aquarius and was finally able to locate it and confirm it under high power. By switching back to the 40mm Pentax XL eyepiece, which puts M72 and M73 in the same field of view, Robert managed to locate and confirm the tiny so-called open cluster M73 in Aquarius, which is actually just a group of four dim stars. Hmmm. Robert was now at 108 objects and counting.

By this time, it was 04:50 and the horizon was beginning to brighten. The final object, M30, a medium-size glob in Capricornus with surface brightness of only 11.0 seemed impossible, and so it turned out to be for Steve and Robert. Paul persisted, and was eventually able to locate M30 with his setting circles in the gathering dawn. He put high power on the object to bring it out against the sky, and called Steve and Robert over to confirm that he had M30 in the eyepiece.

The final totals:

Jones110 objects (missed none)

Thompson108 objects (missed 74 and 30)

Childers100 objects (missed 74, 77, 33, 76, 79, 32, 110, 72, 73, and 30)

As dawn broke, we tore down and packed up our equipment and prepared to head home. We decided by acclamation that the Second Annual WSAL Messier Marathon would be held no earlier than March 2103.

PREV PREV NEXT NEXT

Hack 31. Photograph the Stars with Basic Equipment

Shoot star trail images.

If you have been interested enough in astronomy to read up on the subject, you've no doubt run into a number of stunning photographs of celestial objects. Many have been taken by professionalsno one with the astronomy bug can fail to fall in love with Hubble photographs. But, a large number of them are credited to amateurs, like you, with amateur telescopes, like yours, perhaps. It is then inevitable for the new (or not so new) amateur astronomer to decide that she, too, should take beautiful photographs to hang above her fireplace or to publish in one of the many fine astronomy magazines.

There is only one problem. Taking decent astrophotos is a tedious, difficult, time-consuming endeavor. It's also very expensivesuperb astrophotos increase the demands in all categories by an order of magnitude and require a pinch of luck.

I don't write this to discourage you. You will want to take astrophotos. Many experienced amateur astronomers scoff at the newbies' urge to take stunning photographs. But what they won't tell you is that they, too, long to take such photos and only through a superhuman effort of will (or the budget balancing efforts of an astrospouse) do they avoid temptation.

Astrophotography, like observing or equipment building, is a simple concept plagued with confusing details. The beautiful photo you admire in Sky & Telescope or Astronomy represents hundreds of hours and thousands of dollars invested by the photographer. You may wish to dive into astrophotography and, with perseverance, you will someday take good photos. There are a lot of methods and tips you'll need to know and you'll have to find most of them elsewhere, as none of the authors of this book have expertise in the area.

However, we can get you started.

The simplest astrophoto is known as a star trail. As Earth rotates on its axis, the stars appear to move in the sky, rising in the east and setting in the west. In so doing, they describe a circle around the celestial pole. If you photograph a group of stars for several minutes with a stationary camera, you'll capture a portion of this circle and you'll see an arca star trail.

In order to have stars appear as points, rather than trails, it is necessary to have the camera and telescope rotate in such fashion as to compensate for Earth's rotation. (An exposure long enough to show stars is long enough to cause trailing unless the camera and scope track.) This requires an equatorial