

RASC Calgary Centre - Binocular Observing Certificate



Or: Get into astronomy up to your elbows!

By: Roland Dechesne and Tom Cameron
Page last updated June 22, 2006

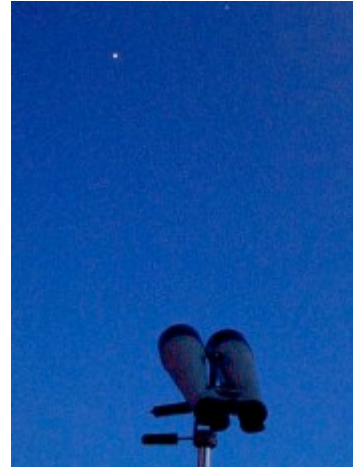
CONTENTS

[Binoculars Are Your Friends](#)
[Size and Scale in the Night Sky](#)
[Observing Certificates: General Information](#)

[RASC Calgary Centre Binocular Deep Sky Observing Certificate](#)

- [Fall Objects](#)
- [Winter Objects](#)
- [Spring and Early Summer Objects](#)
- [Summer Objects](#)

[Other Objects Worth Hunting Down](#)
[Challenge Objects](#)

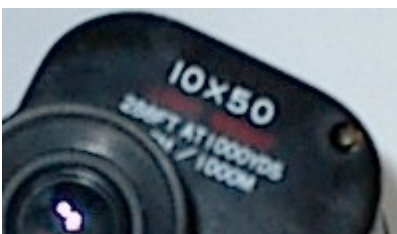


Binoculars Are Your Friends

Beginner amateur astronomers can feel overwhelmed by the wealth of equipment available and by the vastness of the night sky. However, getting started in astronomy is actually easier than many people think. For example, beginners commonly are surprised to learn that binoculars are the best way to start in this hobby. With a little thought, it is easy to see why binoculars are the perfect first telescope. The wide field of view offered by typical binoculars allows you to find an object even if you are a little "off-target". The wide view can represent a significant chunk of typical constellations, meaning that it is easy to relate what you see to naked-eye views and to whole-sky maps such as those found in the [RASC Observer's Handbook](#) or in [Sky News](#), [Astronomy](#) and [Sky and Telescope](#) magazines. In this respect, the right-way-up, two eye, low-power view is thus only a small step away from the naked-eye view.

Using binoculars teaches skills that are valuable at a telescope. These skills include knowledge of the layout of the night sky, the orderly march of astronomical objects from east to west during the course of a night, the differing constellations that are prominent during the different seasons of the year, using peripheral vision to see fainter objects and other aspects of what is commonly termed "learning to see". The low power of binocular views also reinforces the fact that **sometimes the best magnification in a telescope is a very low one** (quite different from how small department or camera store telescopes are pitched to an unsuspecting public).

Binoculars have another benefit as a first step in astronomy, most people already own or can borrow a pair. This means that starting in this hobby can be done cheaply. Generally, the best binoculars for night viewing have moderate magnification and large objectives.



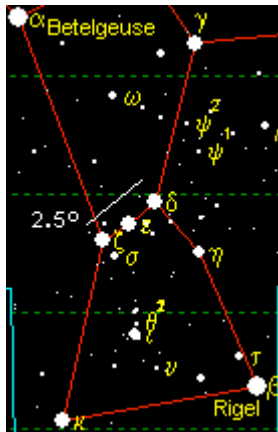
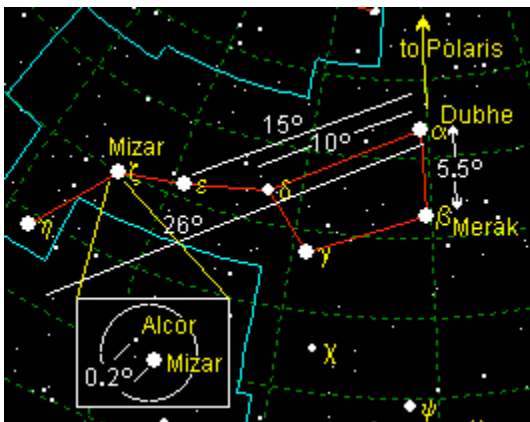
Binoculars always have two numbers associated with them - e.g. 10x50. The first number is the magnifying power (10 means objects appear 10 times larger). The second number is the size of the large objective lenses in millimetres (50 mm). Astronomical objects will appear brighter through larger lenses. Although binoculars are available in many configurations (7x35, 8x40, 10x25 etc.), for astronomical purposes, 10X50's are ideal.

Magnifications higher than 10 are tough to hold steadily (due to their large size and weight), while the light grasp of lenses smaller than 50 mm means that fainter objects may be invisible. Don't rush out to buy new binoculars if you already have something, even if they're not ideal. Astronomy can be a cheap hobby, or it can break the bank if you're not careful! Roland has successfully used 8X24, 7X35, 10X40 and 9X63 binoculars for stargazing in Calgary, so don't worry that your binoculars won't do the job, they probably will. Keep in mind other potential uses of binoculars: bird watching, sports, hiking, opera..., so you may want to get something smaller than 10X50 if you want to use them elsewhere. For reasonable quality, try to spend at least \$100 on a pair of binoculars. Good 10X50's will probably cost at least \$160. Very good 10X50 binoculars with better anti-reflection coatings, improved eyepieces, larger prisms and more rigid construction will cost more than \$200. Zoom binoculars are generally seen as not having the same optical quality as fixed magnification binoculars, but the one pair Roland has looked through were fine. However, it's probably better to avoid zoom models.

Binoculars work best if you can hold them steadily. Tripod mounts are ideal, but sometimes leaning your elbows on a convenient fence or car is all you need. Outdoor lounging chairs, normally used only for summer sunbathing, make good observing chairs since the arm rests are perfect for resting elbows. Use a blanket or an old sleeping bag to keep yourself warm while scanning the skies in this manner. Covering your chair with an inexpensive blue "foamy" sleeping pad adds a tremendous amount of warmth. Have a rag handy as these pads act as if they are some kind of magical dew "magnet" (Roland also uses a "foamy" to make a dew shield for his telescope).



Size and Scale in the Night Sky



It is important to get a sense of the relative sizes of objects as seen in binoculars and telescopes. A good place to start is the asterism "the Big Dipper" in the constellation of Ursa Major. It is about 10 degrees across the top of the bowl of the Big Dipper and about 5.5 degrees between Dubhe and Merak, the "Pointer Stars". 15 degrees is the span between Dubhe (the northern one) and the first star within the handle. The distance from the end of the Dipper's handle to Dubhe and the distance from Dubhe to Polaris are almost the same. One is 28 and the other is 25 degrees. Can you tell which is the greater distance? The star that forms the bend in the Dipper's handle, Mizar, has a fainter star, Alcor, next to it. This visual double represents a test of naked eye vision, but the 0.2 degree separation is easily split by binoculars. In binoculars, Alcor and Mizar make a flattened triangle with a third, fainter, star. A real test in binoculars is the fact that Mizar is itself a true binary (the stars are gravitationally bound) with a separation of 14 arcseconds. Can you see this? A small telescope will readily separate this pair. The belt stars of Orion span 2.75 degrees and the Pleiades are about 1.5 degrees across. A pinky at arm's length represents 1 degree, three fingers is 5, a fist is about 10 degrees. Typical binoculars have fields of view that are around 5 to 7 degrees in diameter.



Observing Certificates: General Information

Getting to know the night sky is not difficult. The easiest way is to have some sort of project that gets you outdoors on a regular basis. Amateur astronomers have a number of projects they can carry out. Some of the most satisfying projects are those based on observing deep-sky objects on some of the well-known lists. For example, certificates are available from the national office of the Royal Astronomical Society of Canada for observing the 110 objects on [Charles Messier's](#) list of nebulae and star clusters. As proposed by the Calgary Centre, a certificate is now available from National for observing the Finest 110 NGC (New General Catalog) objects listed by Alan Dyer in the [RASC Observer's Handbook](#).

The Calgary Centre's Messier Marathon Certificate is a record of how many of the "Messier's" you found in a one night observing "binge". For information on obtaining any of these certificates, call Tom Cameron, your Observers' Group chair, or join in on the fun at an Observers' Group meeting at the Wilson Coulee Observatory (everyone's welcome). Advanced observers commonly move onto the [Herschel 400 list](#). While almost all the [Messier objects](#) can be seen in a single night in the spring, sketching the entire lot typically takes most beginners at least 2 to 3 years. Binoculars will suffice for locating many of the Messier and some of the Finest NGC objects, but most will be seen as a tiny smudge against the black sky.



RASC Calgary Centre Binocular Deep Sky Observing Certificate

For starting out, we propose a list of deep-sky objects, most of which will actually look like something with the naked eye or binoculars. Indeed, some of these objects can not be seen well with a telescope, they are so large. The following objects represents an opportunity for the beginning amateur astronomer to learn the sky while hunting objects with binoculars or the naked eye that have a distinctive visual "punch". These objects are a good sampler of what can be seen in the night sky. While many of these objects can be seen with the naked eye, and can be studied in telescopes, binoculars provide wide-field views that show these objects in their context.

As there are only 25 objects on the binocular deep sky list, it should be possible to sketch all of them within a year. When you are successful in hunting them down, you'll receive a handsome certificate to recognise your accomplishment. As a bonus, a number of these objects are on the Messier or Finest NGC lists (so you will have a head start on these lists).

While all deep-sky objects are seen more easily during a moonless night away from city light pollution, it should be possible to find most of the objects on this list from most places within the city (trying still to avoid moonlit skies).

The Binocular Deep Sky Observer Certificate program is the product of a veritable team of observers: besides ourselves (R.D. and T.C.), Carol and Rick Weis, John Mirtle and the Observers' Group have important input into this list. Bob Morgan reviewed this information.

To get the most of your observations, use a simple log book in which you record the date and time of your observations as well as a description or a sketch of the objects. This can be a bound notebook or a 3-ring binder. To sketch star fields with abundant stars, Father Kemble suggests defocussing your telescope or binoculars until only the brightest stars are visible. Sketch these first to make the "bones" of your drawing. Progressively focus and sketch until you have included all you can see.

The Binocular Deep Sky Observer Certificate are available by presenting your sketches, photos or descriptive notes to the Observing Group chair, Tom Cameron (I bet you thought the Observers' Group chair was a recliner lounge after reading the introductory!).

So what are you waiting for? As John Mirtle is fond of saying, "Turn off the T.V."



RASC Calgary Centre Binocular Deep Sky Observing Object Lists:

The objects are roughly organised by Right Ascension and thus can be thought of as grouped by season. An all-nighter will allow you to get objects from 2 or more seasons. These charts were produced using David Lane's *Earth-Centered Universe* software.

Fall Objects

Use the Late Fall Milky Way Detail Chart

<i>Andromeda Galaxy (Messier 31)</i>	Largest spiral galaxy in Local Group. Generally acknowledged as the farthest thing the average unaided eye can see at around 2 million light years. Use the western 3 stars of Cassiopeia as an arrow that points to β Andromeda (Mirach), then follow the "Y"-shaped star pattern back to the galaxy
<i>Messier 34</i>	This open star cluster in Perseus lies about 5° west of Algol
<i>Perseus Double Cluster</i>	Two open star clusters (NGC 869 and 884) at different distances from us, each with about 300 stars. This field is about midway between the central star in Cassiopeia's "W" and α Perseus (Mirfak, in the middle of Melotte 20).
<i>Stock 2</i>	Sparse open star cluster, cross-shaped? About 2.5° north of the Double Cluster. Easier seen than photographed.
<i>Melotte 20</i>	Spectacular stellar association surrounds α Perseus, many naked-eye stars in group.
<i>NGC 1502 + Kemble's Cascade</i>	Starting at Melotte 20, moving about 12° towards Polaris will put you onto this tiny open cluster and unassociated star chain in Camelopardalis. The chain is named after the late western Canadian amateur astronomer Fr. Lucian Kemble who likened it to a waterfall into a pool (NGC 1502).

Winter Objects

Use the Early Winter Milky Way Chart

Hyades Cluster (Melotte 25) This moving cluster is key to establishing stellar distances and absolute brightness estimates. Aldebaran is a foreground object. The "V" that forms Taurus' face is only part of the cluster. Note the group of stars just to the north of this "V". Orion's belt points at the Hyades, extending the line takes you on to the Pleiades. Extending the line farther and slightly curving the line towards Polaris brings you to Melotte 20 in Perseus.

Pleiades Cluster (Messier 45) Open star cluster with 300 members, about 45 million years old (the dinosaurs never saw these beauties). Very clean optics and dark skies are necessary to see the wisps of gas surrounding these stars.

Use the Southern Winter Milky Way Detail Chart

Collinder 70 A conundrum. Everyone's seen this, but it is not generally known. This large, sparse open cluster surrounds and includes Orion's belt stars.

Orion Nebula (Messier 42 and 43) A showpiece in almost any telescope with the right conditions, binoculars can also show a lot of detail in the Orion Nebula in a dark country sky. Also in your view will be a sparse open cluster that helps form Orion's sword.

Messier 41 This open cluster in Canis Major is about 4° south of Sirius. Together with a moderately bright star on its southern margin, this cluster looks a bit like a comet with a bright head in binoculars.

Messier 48 To find this open cluster, imagine a line between Sirius in Canis Major and Regulus in Leo. Intersect that line with a second line extending from the constellation Canis Major southeast from Procyon (see late Winter Chart).

Spring and Early Summer Objects

Use the Late Winter - Spring Chart

Messier 35 This open cluster lies at the foot of one of the Gemini twins. Extending a line from the Orion Nebula through Betelgeuse gets you in the neighbourhood. If this open cluster is easy, try M36, 37 and 38 in nearby Auriga.

Praesepe (Messier 44) This open cluster is also called the Beehive and the Manger. This sparse cluster has many attractive triangle patterns in it. Look for it about midway between Regulus in Leo and Castor and Pollux in Gemini.

Use the Coma Detail Chart

Coma Berenices (Melotte 111) This open cluster is nestled between the hind quarters of Leo and Ursa Major. We are looking at this cluster through the much nearer Ursa Major cluster (it includes most of the stars in the Big Dipper asterism as well as some stars in Leo, Canes Venatici and Boötes). In the distant background, lies the Coma-Virgo cluster of galaxies (most of which are not visible in binoculars).

Use the Early to Mid Summer Detail Chart

Messier 13 The northern hemisphere's best globular cluster (but try M3, 22 and 92). The cluster lies along the western side of Hercules' "keystone" asterism (flowerpot-shaped lower torso). This collection of over 100,000 stars will always look like a fuzz ball in binoculars.

Messier 39 This sparse open cluster in Cygnus has a triangular shape. Start at Cygnus' Deneb and move along the Milky Way towards Cepheus and Cassiopeia about 10 degrees.

Summer Objects

Use the Early to Mid Summer Detail Chart

Coathanger
(*Collinder 399*) Also known as Brocchi's Cluster, this group of stars is actually not a cluster. A real crowd pleaser. Extend the prominent 3 star line in Aquila that has Altair in it up towards Vega in Lyra to guide you into the right part of the sky which is below the foot of the Northern Cross (Cygnus).

Dumbbell Nebula
(*Messier 27*) The only planetary nebula on the list. The rest are much fainter. The wedge-shaped Coathanger points toward it.

Use the Southern Summer Milky Way Detail Chart

Scutum Star Cloud A dense portion of the Milky Way. Look for the foreground open cluster M11. An arc of naked-eye stars forms a bowl shape just above the cloud.

Sagittarius Star Cloud This dense portion of the Milky Way was catalogued by Messier as his #24. Many catalogues mistakenly ascribe the M24 name to a superimposed open star cluster, NGC 6603. M24 looks like a cloud of steam coming out of the spout of Sagittarius' "teapot".

Messier 23 About 100 stars populate this open cluster in Sagittarius, which lies west of M24.

Messier 25 A large diameter cluster with about 50 stars, just east of M24.

Messier 17 The striking shape of this emission nebula has been compared to a swan. In dark skies with telescopes more nebulosity is visible and the whole affair looks like an Ω (omega). Look for it just north of M24.

Lagoon Nebula
(*Messier 8*) Locate the back side of the Sagittarius "teapot" asterism and extend the curve upwards and to the west. M8 is a fuzzy "star" that is an easy naked-eye object in a dark sky. This is a real treat. An embedded open star cluster provides the energy to make the gas glow. Trifid nebula (M20) is nearby, but much fainter.

Other Objects Worth Hunting Down

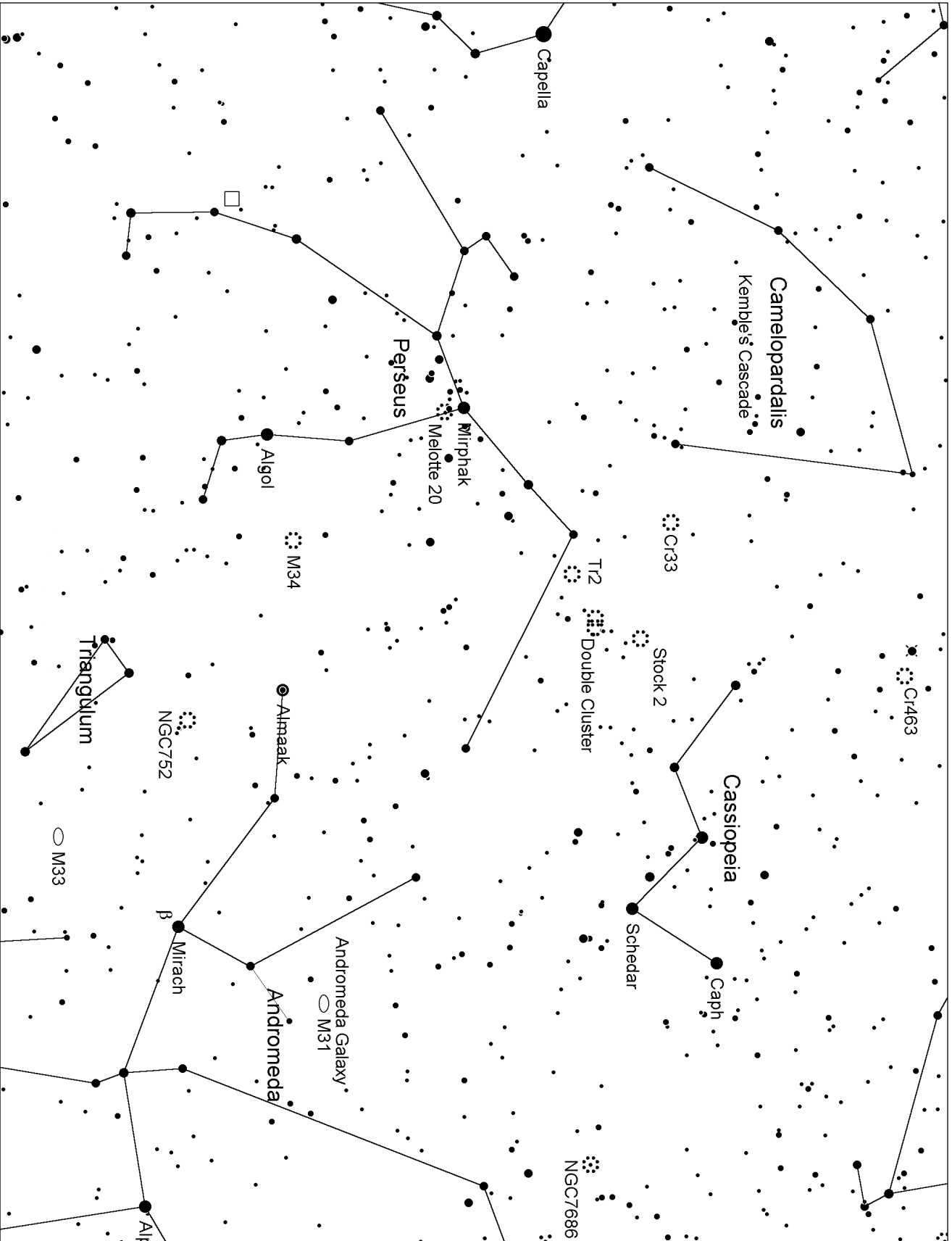
NGC 752 is not on the list, but is a fine target nonetheless. Blair Colborne likens it to a golf ball and club. Use the Late Fall Milky Way Detail Chart.

Many objects in Sagittarius besides those listed here are visible with binoculars. Spend some time sweeping the region with your binoculars. Some, like M16, the Eagle Nebula look quite different than the photos: mainly visible in binoculars is the sparse star cluster.

Challenge Objects

If you have succeeded in seeing all of the objects for this certificate, and have access to a dark site when there is no Moon in the sky, try these challenge objects:

<i>Triangulum Galaxy</i>	Messier 33, Late Fall Milky Way Detail Chart
<i>Cygnus Rift</i>	this large dark dust lane in the Milky Way is best without optical equipment
<i>North America Nebula</i>	NGC 7000, between Deneb and M39
<i>Veil Nebula</i>	NGC 6960, 6992/5, in Cygnus
<i>Messiers 6 and 7</i>	large open clusters in Scorpius, near to the horizon from Calgary
<i>Nebulosity in Pleiades</i>	tough without very dark skies and clean, dew-free, optics
<i>California Nebula</i>	NGC 1499, in Perseus - apparently visible with the unaided eye and a Hydrogen- β light pollution filter



LEGEND

STARS
Mag Limit: 6.0

●	0
●	1
●	2
●	3
●	4
●	5
●	6

- Variables
- Doubles

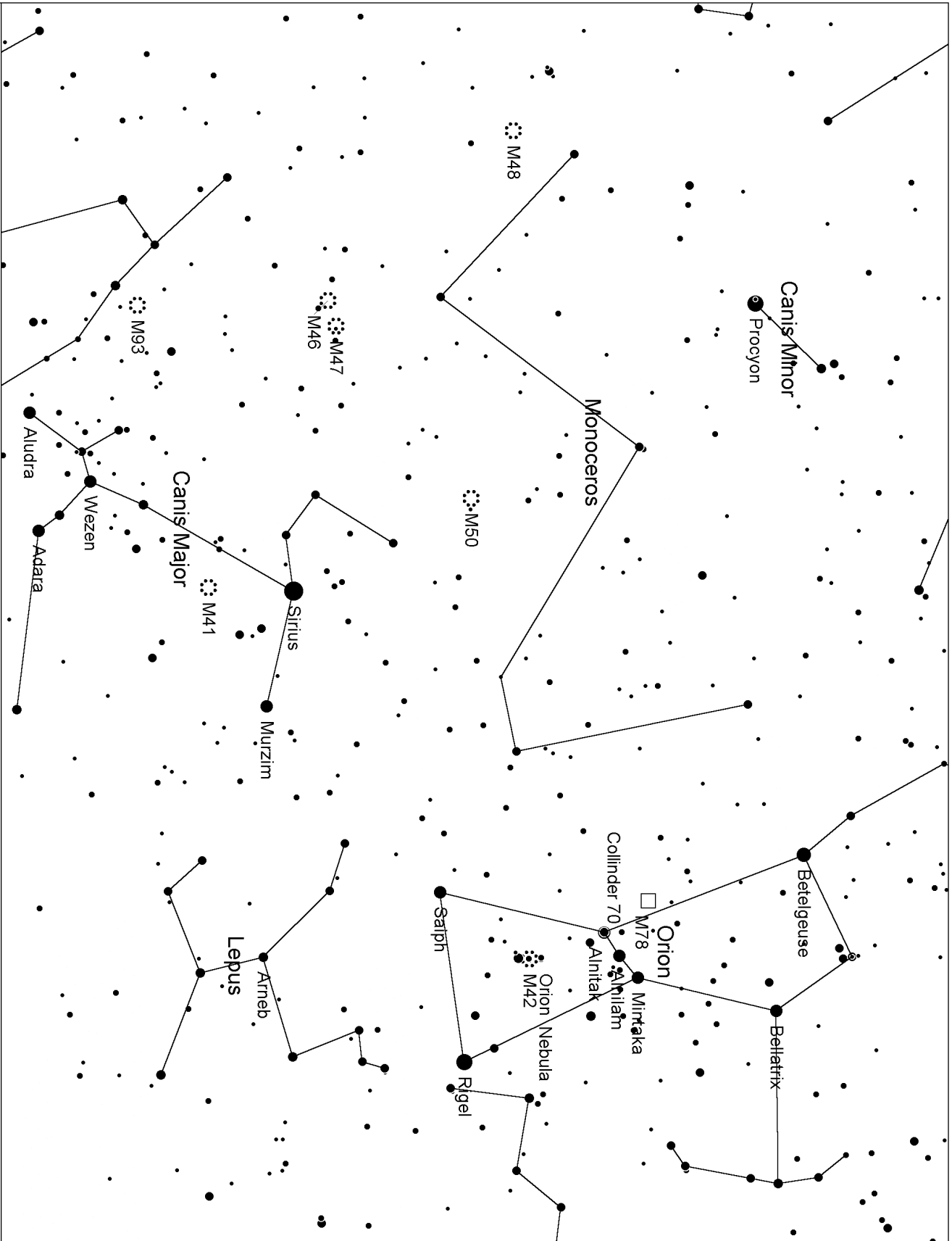
DEEP SKY
Mag Limit: 6.1

- Galaxy
- ⊕ Globular Cl
- Open Cl
- Bright Neb
- Planetary
- × Other

NOTES

ECU Pro V5.0 (Star Atlas Mode) - Late Fall Milky Way Detail Chart

Right Ascension=02:21:01 Declination=+51°26'00"
Field Height=45.60°



ECU Pro V5.0 (Star Atlas Mode) - Southern Winter Milky Way Detail Chart

Right Ascension=06:39:00 Declination=-08°15'00"
Field Height=45.20°

LEGEND

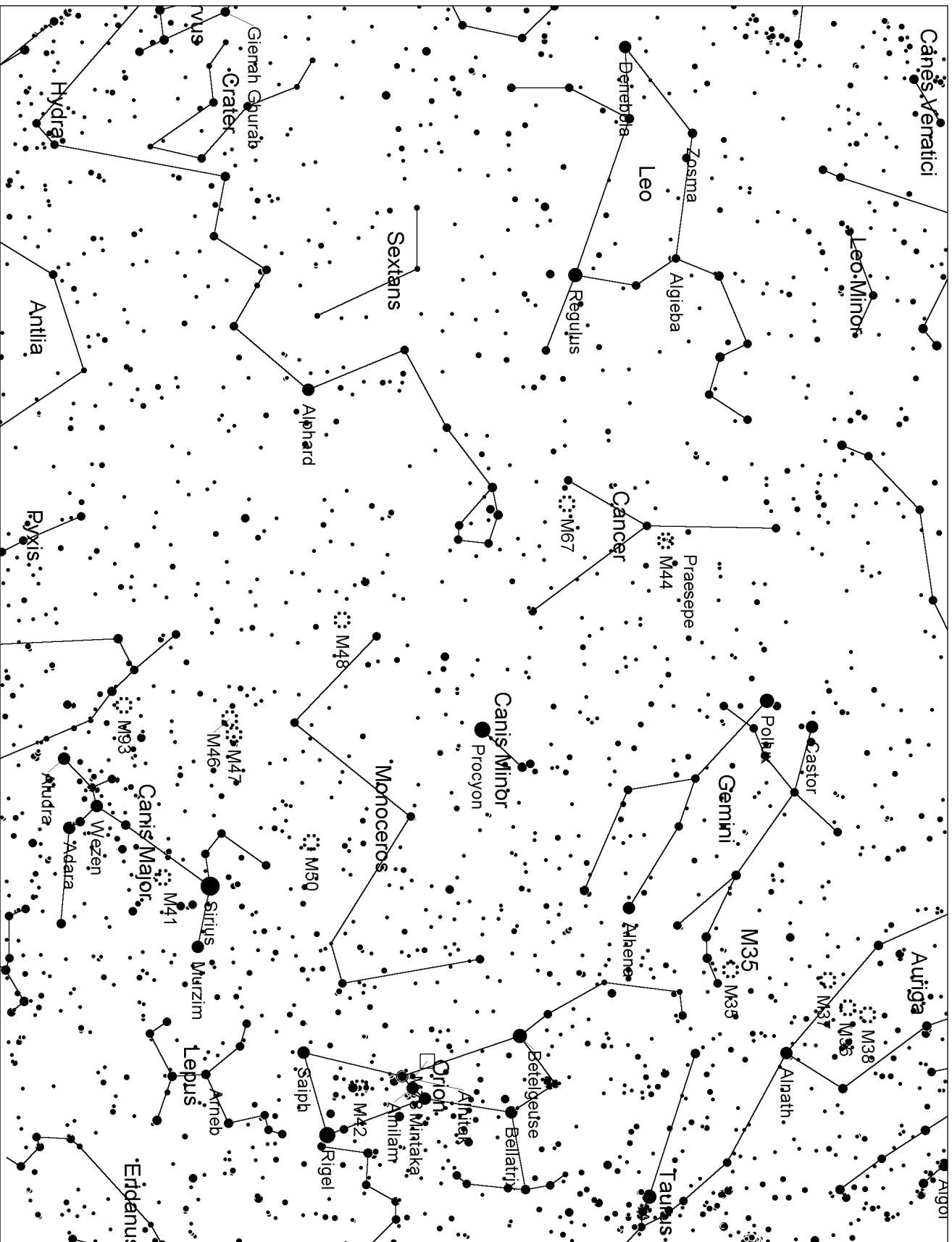
- STARS**
Mag Limit: 6.0
- 0
 - 1
 - 2
 - 3
 - 4
 - 5
 - 6

- Variables
- Doubles

DEEP SKY
Mag Limit: 8.0

- Galaxy
- ⊕ Globular Cl
- ⊙ Open Cl
- ☉ Bright Neb
- Planetary
- × Other

NOTES



ECU Pro V5.0 (Star Atlas Mode) - Late Winter - Spring

Right Ascension=08:12:00 Declination=+04°36'00"
 Field Height=80.00°

LEGEND

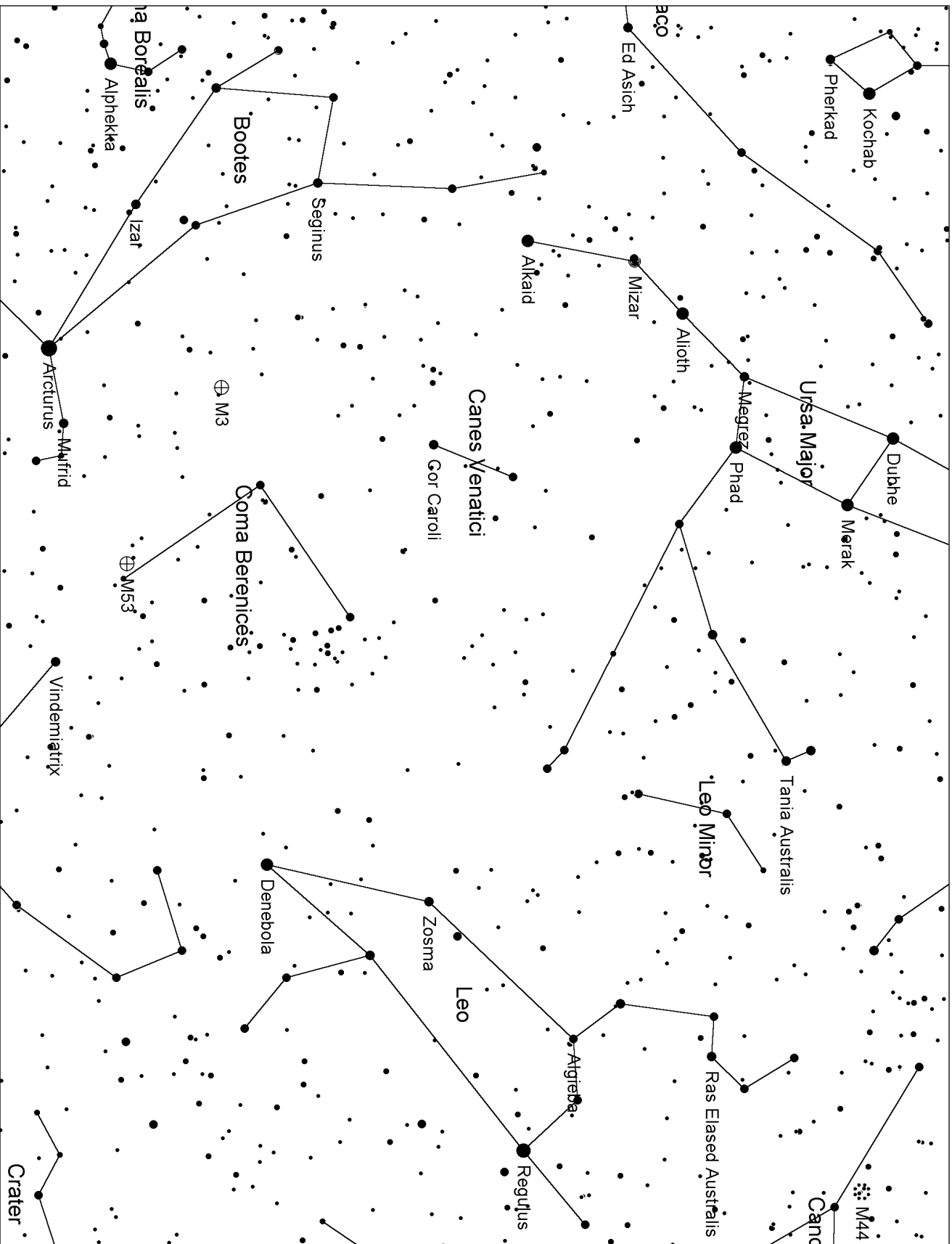
- STARS**
 Mag Limit: 6.5
- 0 ● 4
 - 1 ● 5
 - 2 ● 6
 - 3

- Variables
- Doubles

DEEP SKY
 Mag Limit: 8.0

- Galaxy
- ⊕ Globular Cl
- Open Cl
- ☉ Bright Neb
- Planetary
- × Other

NOTES



ECU Pro V5.0 (Local Horizon Mode) - Coma Detail Chart

Right Ascension=12:03:18 Declination=+34°00'00"
 Field Height=60.80°

LEGEND

STARS

Mag Limit: 6.5

- 0 ● 4
- 1 ● 5
- 2 ● 6
- 3

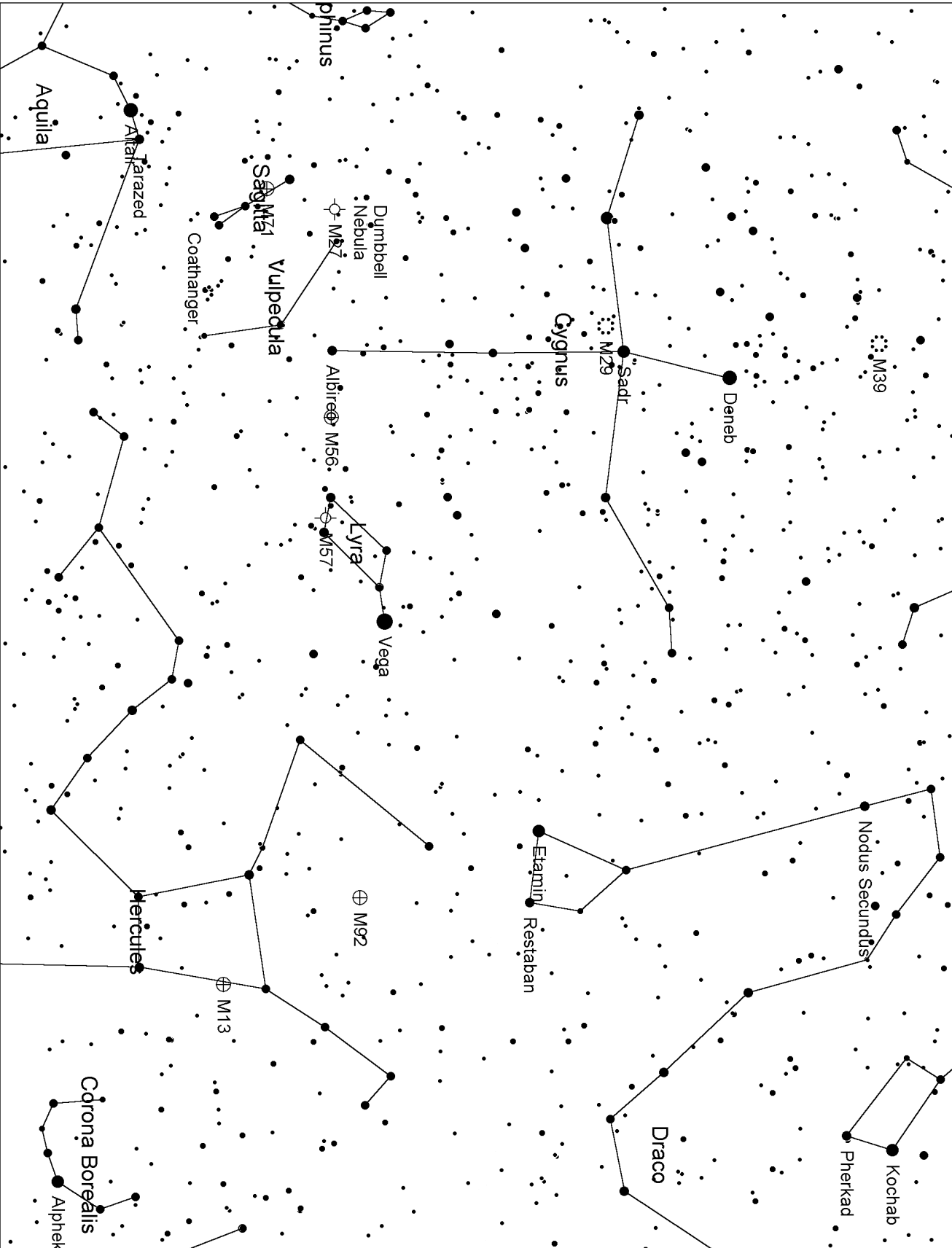
- Variables
- Doubles

DEEP SKY
 Mag Limit: 10.0

- Galaxy
- ⊕ Globular Cl
- Open Cl
- ☉ Bright Neb
- Planetary
- × Other

NOTES

--	--



LEGEND

- STARS**
Mag Limit: 6.5
- 0 ● 4
 - 1 ● 5
 - 2 ● 6
 - 3

- Variables
- Doubles

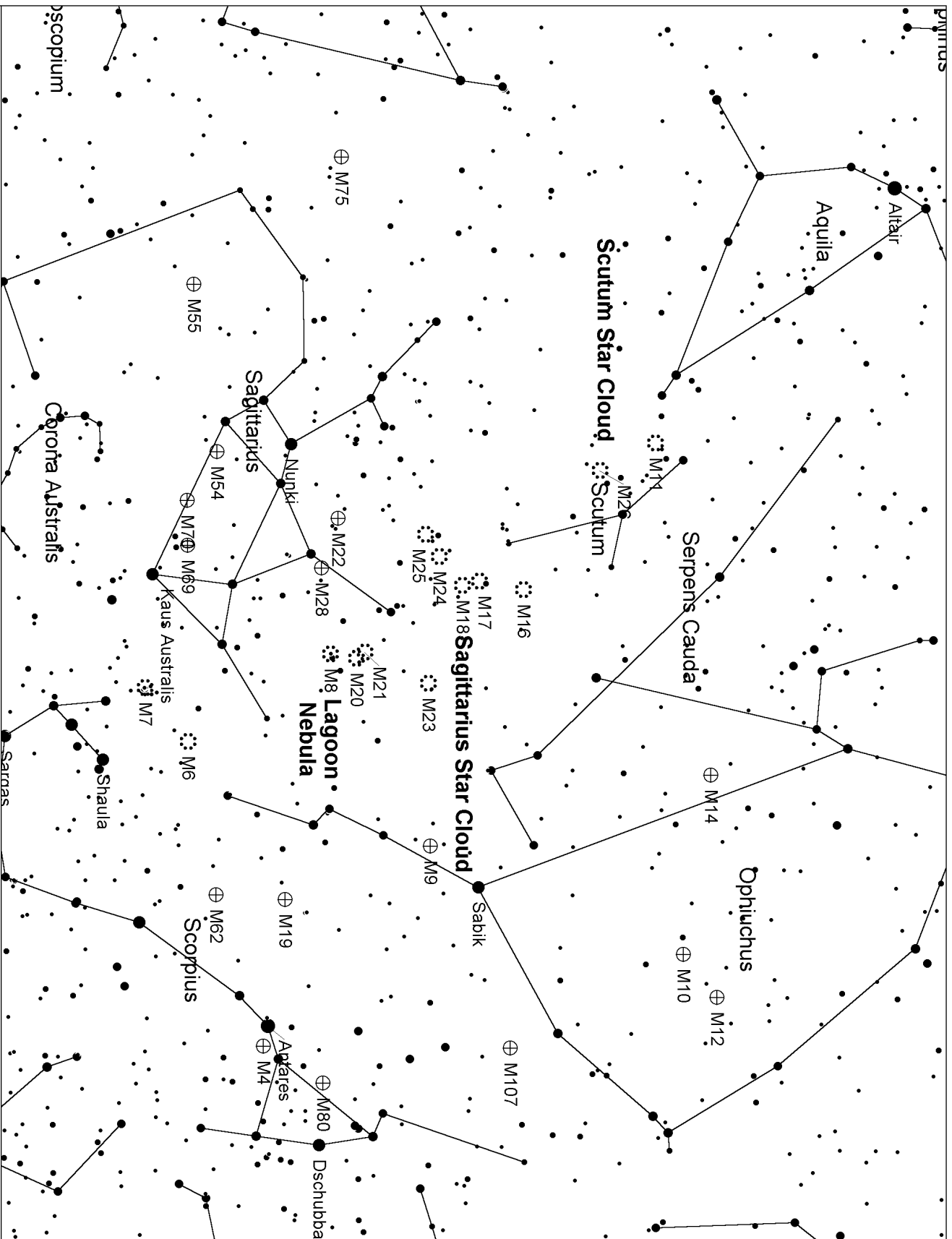
DEEP SKY
Mag Limit: 10.0

- Galaxy
- ⊕ Globular Cl
- ☉ Open Cl
- ☁ Bright Neb
- ♁ Planetary
- × Other

NOTES

ECU Pro V5.0 (Local Horizon Mode) - Early to Mid Summer Detail Chart

Right Ascension=18:49:00 Declination=+43°23'00"
Field Height=55.00°



ECU Pro V5.0 (Star Atlas Mode) - Southern Summer Milky Way Detail Chart

Right Ascension=18:11:01 Declination=-16°31'00"
 Field Height=53.65°

LEGEND

- STARS**
 Mag Limit: 6.5
- 0
 - 4
 - 1
 - 5
 - 2
 - 6
 - 3

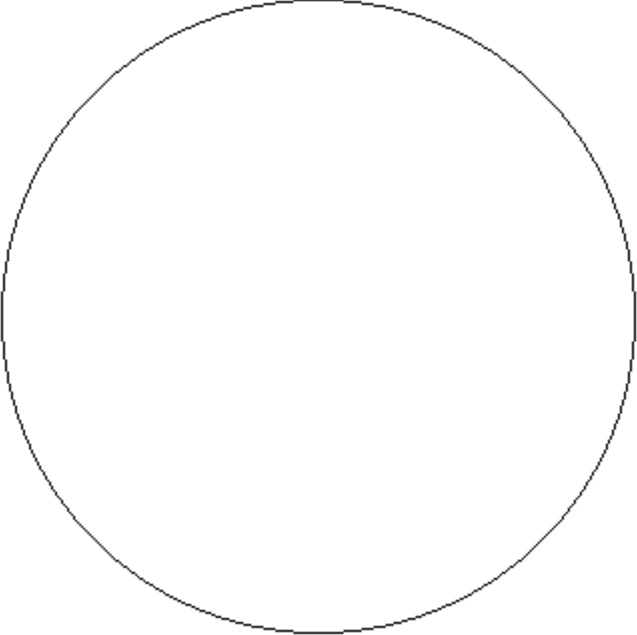
- Variables
- Doubles

DEEP SKY
 Mag Limit: 11.9

- Galaxy
- ⊕ Globular Cl
- ☼ Open Cl
- ☼ Bright Neb
- ☼ Planetary
- × Other

NOTES

**Royal Astronomical Society of Canada - Calgary Centre
Observing Form For The
Binocular Deep Sky Observing Certificate**

<p>Object: _____</p> <p>Constellation: _____</p> <p>Instrument: _____</p> <p>Magnification: _____</p> <p>Date: _____</p> <p>Time: _____</p> <p>Sky Conditions: _____</p> <p>Description of Object: _____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>		
<p>Object: _____</p> <p>Constellation: _____</p> <p>Instrument: _____</p> <p>Magnification: _____</p> <p>Date: _____</p> <p>Time: _____</p> <p>Sky Conditions: _____</p> <p>Description of Object: _____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>		