DIY Micro and Mini OBSERVATORIES

The GSO, Ottawa, ON
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The GDO, Greely, ON
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The MDO, Ottawa, ON
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GSO ... Garden Shed Observatory

A weekend job …

7’x4’ floor frame

½” plywood floor

Crushed stone

Vinyl panels + spars

Slides together
GSO … observatory? I see no observatory!

Green beans
Trellises
Flower pot

… it’s a garden shed!

Garden Shed Observatory
GSO ... no astronomy here!

This really is a garden shed
GSO ... opened up

Footprint - 7’x 4’
Height - variable
Sliding roof
Aperture - good
Crushed stone

Garden Shed Observatory
GSO ... the wiring system – and view from without

External jacks
Extension chord
Control cables for …
Scope
Handbox
Cameras

Garden Shed Observatory
GSO ... cabling - plus support/decoration?

Electrical power

Buried control cables

Recycled bricks

Garden Shed Observatory
GSO ... observing aperture

Double Tongue & Groove
Sliders are built-in
No modification required

Roof aperture ...
Before scope is installed
GSO ... roof “mechanics” - the principal modification

Two metal plates
Central roof spar
Handle
GSO ... telescope installed!

LX-200 GPS 10” on wedge on tripod

It fits …

… but only just!

Pier wouldn’t make a difference … unless hydraulic
GSO ... telescope installed!

LX-200 GPS 10” on wedge on tripod

It fits …

… but only just!

Pier wouldn’t make a difference … unless hydraulic
GSO … minimal gadgets

Monitor for MallinCam
Lamp and timer
Mini heater for roof
GSO ... anti-snag system for MallinCam video camera

Hook and pulley for multiple video cables
GSO … anti-snag system

Detail of pulley …
Very simple!

Pat. Pending!
GSO … anti-static system – required in a vinyl observatory

- Copper strapping
- Copper wire
- Earth
- Duct tape

Garden Shed Observatory
GSO ... vibration suppression system

Holes cut in floor
Post footings + 4x4 blocks
GSO ... water tight - well ... almost!

Slot just behind door

I don’t understand why ...

... but it works!
GSO ... a really tight fit

LX-200 GPS 10"
Scope clearance - 1cm
Strategic stool
Essential broom
Garden Shed Observatory

LX-200 GPS 10”
Motorised focuser
Camera
GSO ... clearance at the business end

LX-200 GPS 10”
Motorised focuser
Camera

Garden Shed Observatory
GSO ... it’s really snug in there

I can just about slide in and out without nudging the scope
Problem …

Classical guide-scope in rings stands too high to close the roof

Required alignment everytime I mount it!!

Garden Shed Observatory
GSO ... zero clearance

Solution...

Mini guide-scope on custom mount

20 seconds to install ... no alignment required
GSO ... zero clearance

Solution...

Mini guide-scope on custom mount

20 seconds to install ... no alignment required
GSO ... even in winter

All dug out
Roof easy to clear
Ready to open up
Might need de-icer
GSO ... winter-proofing the roof

Vinyl tarp
Bungie chords
5 second snow/ice removal

Garden Shed Observatory
Garden Shed Observatory

GSO … single light-bulb takes edge off cold inside

Note the thinned snow directly above the location of the light bulb
GSO ... winter observing

2 minutes for shut down and closing roof ...

... then straight to bed!

Garden Shed Observatory
GSO ... warm room (aka: the house)

Protection from cold, bugs, humidity etc etc
GSO … what did it cost to build?

$450 for the shed  
$50 for lumber  
$50 for delivery

Domestic harmony
Priceless!
The GDO
Greely Deck Observatory

From Concept to Result
The GDO

The Scenario:

- Semi rural ½ acre lot on the southern edge of Ottawa, On.
- Two story home with south facing back yard. Deck off back of house has served as an observing stage for 27 years. Additionally a 'guest astronomer's pad' was constructed to accommodate visiting astro observers.
- Well tended gardens is the pride of my spouse, hence any 'additions' must be approved.
- Quite reasonable skies, house shields Ottawa light dome.
The GDO

An actual Guest Astronomer
The GDO

Considerations

- Heavy dew when observing off the deck on lawn.
- Vibrations when observing on the deck makes astro imaging challenging.
- Observing on the deck takes better advantage of the house blocking the Ottawa light dome.
- Needs to blend in and have a small footprint.
- Mosquitoes in summer, snow in winter – take advantage of the screen house and proximity to patio door / kitchen nook
- Setting up and polar aligning is time consuming and wearing.

Typical set up
In the early days
A few more things to consider

- Soil Type: In my case, I'm on the shores of the ancient Champlain Sea sitting on top of 65 feet of sand. Digging a 4 foot hole with a post hole digger was almost effortless. Clay soils are much more challenging and prone to frost heaves in the winter, and surface water in heavy rains.

- Need to consider site drainage ... how rain and snow melt drain in the area of interest. I rose the top of the cement base 6 inches above grade so the base of the metal pier would never be under water in the spring (one reason why using the Guest Astronomer pad would have been less advantageous).

- Need to be out of the ambient lighting as much as possible. In an urban neighbourhood, consideration must be given to lights from adjacent backyards, street lights, and in my case .... lights from landing airplanes. Additionally, urban observatories are subjected to heavy light pollution. In Greely, the light dome of the city is in the north. I deliberately positioned the GDO so that I can take a bearing on Polaris for alignments, however the house blocks out 90% of the Ottawa light dome.

- Access to electrical power. If separated from the house, care must be afforded to safe electrical arrangements.

- Access to the fridge, microwave, coffee pot, popcorn maker and wifi.
The GDO

Solution:

- Dig a hole below the frost line (4 feet deep required in my case)

- Pour a concrete foundation 4' below grade. It's great to have friends when mixing cement. They love to sit on the deck and point out that you are sweating profusely and must need another drink.

- Fabricate a steel pier that can be polar aligned and leveled and can accommodate my Meade LXD75 mount. Welding is a hobby of mine, and my Lincoln 135SP MIG welder made it an easy job (actually, I used flux core welding wire... a little more spatter, but nobody can see it in the dark.)
The GDO

Extend deck around pier (Thank you Moe!!) Construct cabinet with casters

Add insulation, power bar, 60W light bulb heater, mouse proofing, flip up work shelf

Rodent/weather plate

1/4-20 knob locks cabinet to pier
The GDO

A few details:

- Meade LXD75 mount
- Base from tripod top
- Top plate fabricated to secure base
- 5/8” bolts allow leveling and access to knob which secures the Meade mount
- Flip up table
- Insulation (fiber glass ceiling panels)
The GDO

A few more details:

- Vents with 12v fan for cooling in summer
- Snow shovel for winter access
The GDO Details on the Pier

- 4" Tube
- 1.5" Tube
- 10x10" plate
- 5/8" Threaded Rod
- 10" Sono Tube and Concrete pillar 4ft. below grade
- Mounting Gussets
- Tripod Head adapter
- Mounting Knob
- 5/8" Bolts For Leveling and Access to Mounting Knob
- 4" Tube

For Leveling and Access to Mounting Knob
The GDO

There are some that believe it was all done to accommodate the BBQ. Others see it as an operational observatory.
The GDO

$85 for metal bits
$200 for lumber,
screws and deck
supports.

$? for all the scrap
parts I had lying about
the garage... including
the plywood for the roll
off cabinet, castors
donated from the
MDO, various bits of
hardware and stuff

Yes!!! A paint job is scheduled for Spring 2014 after the PT lumber cures
MDO
Moe's Deck Observatory, Ottawa, Ontario
The Scenario:

- Garden Home Condo in Orleans, On.
- North facing back yard with good exposure to the western sky.
- Light Pollutions is an issue necessitating the use of a MallinCam for most objects,
- The pier will be used for several telescope mounts
- Clay soil, making digging below the frost line an arduous task.
MDO

The Solution

Construct a 4x3 foot crib and fill with cement....

Fabricate a 10x10in. Plate to serve as a template for the 5/8in mounting bolts.

Insert and level the bolts and plate into the cement while curing
The Solution

Fabricate a 4x4in. square tube pier assembly (based on GDO design) then mount on the 5/8” bolt and plate assembly

Fabricate a top plate assembly with mounting holes for a Celestron SE mount and a Meade LS mount and allow for level adjustments.

Make arrangements to store mounting bolts on the pier
Construct a wooden deck over the cement base and add river stone surround.

Enjoy observing with either the Celestron SE mount or....

....the Meade 6” ACF LS.