November 2021
Editor Bob Crosthwaite

The Great Melbourne TELESCOPE

Phoenix

Astronomical Society of Victoria (A.I.N. A0002118S)

WHAT HAS BEEN HAPPENING WITH THE PROGRESS OF THE GREAT MELBOURNE TELESCOPE RESTORATION AT SCIENCEWORKS IN 2021?

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Early in the year, some members of the fabrication group were able to spend a bit of time with the Great Melbourne Telescope

… but behind the scenes, work still progresses …

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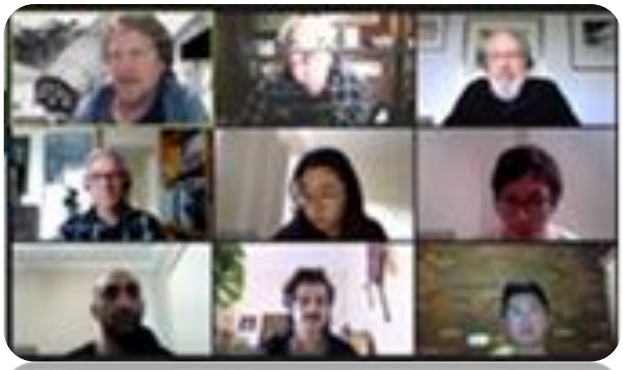
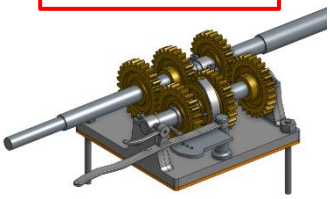
Under the watchful eye of Simon Brink (Project Manager) a large number of team members met, virtually, each week and put in considerable time and expertise, in designing, drafting, trialing ideas and preparing for the time when "Covid Normal" arrives.



Remember there are no diagrams, plans or drawings of The Great Melbourne Telescope, only historical photos, and from these photos, the restoration of the telescope relies.

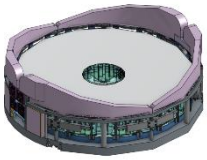
Primary Mirror Cell Design Group

Equatorial Drive Group



Secondary Mirror Cell Design Group

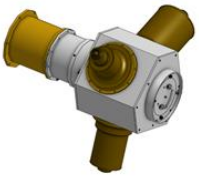
Mirror Cell Fabrication Group

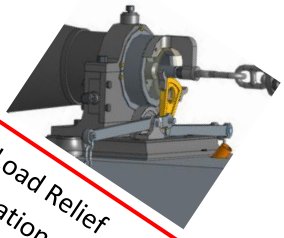


Mechanical Design Group

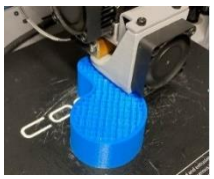
3D Design Coordination Group

Turret & Electromechanical Group





Load Relief Fabrication Group



Casting Group

Mechanical Fabrication Group

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In June this year, a small group of volunteers were given a rare opportunity to visit Dr. Barry Clark's home observatory.

Barry gave the attending group a short presentation, describing his 250 mm Meade Dobsonian telescope.

Although the weather was not kind, the clouds did part later in the evening, and, the group was able to observe the moon.

Not only providing an amazing opportunity, Barry, generously provided a light supper, which was very much appreciated by the group.

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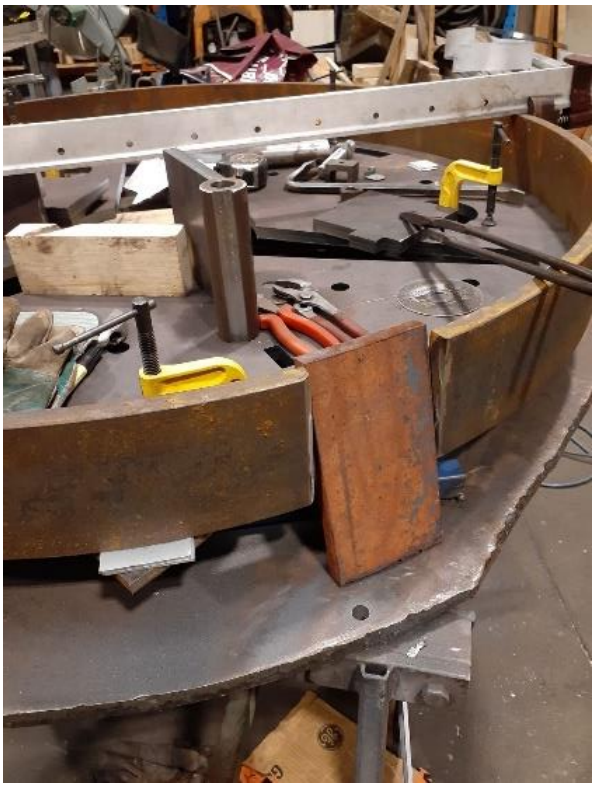
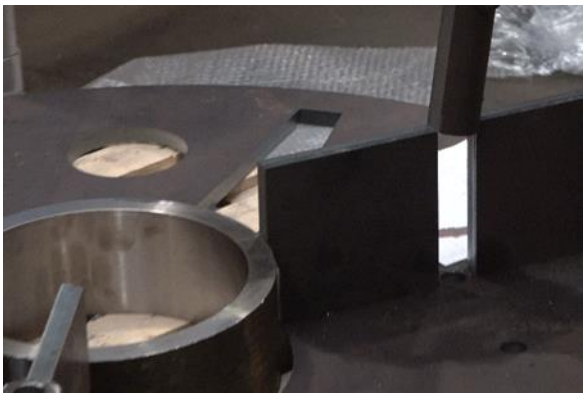
Optical Tube Counterweight Frame

Optical Tube Counterweight Frame -also shows primary mirror top frame

Optical Tube Counterweight Frame

Optical Tube Counterweight Plates





Fabrication of Optical Tube Counterweight Frame

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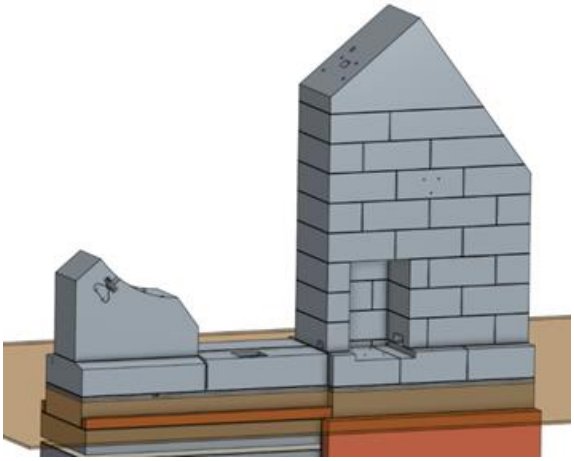
Designing the Great Melbourne Telescope Piers Simon Brink

During 2021 the Royal Botanic Gardens Victoria (RBGV) was awarded a grant to construct replica telescope piers in the Great Melbourne Telescope House.

The piers are to be constructed in stone blockwork to match the original.



Heritage Architects have identified that the original piers were constructed from a soft basalt that occurs to the north of Melbourne, possibly from the Kilmore area as the basalts do not have defects which are common in the harder basalts.

It is unclear if this basalt will be suitable and/or available for replica piers, so a range of alternatives are currently also being considered.

Extensive work was done to develop blockwork designs by Bryan Mooney and Campbell Johns converted into 3D by Chet Yilmaz, then further developed via design chat groups through 2020 and 2021.

Design drawings and the 3D model have now been provided to the RBGV and are being used to develop a heritage permit application for submission to Heritage Victoria.

There will still be some opportunities to fine tune design before tender and/or before finalisation of construction issue documentation in early 2022. Time frames are for completion of the piers by the end of 2022.

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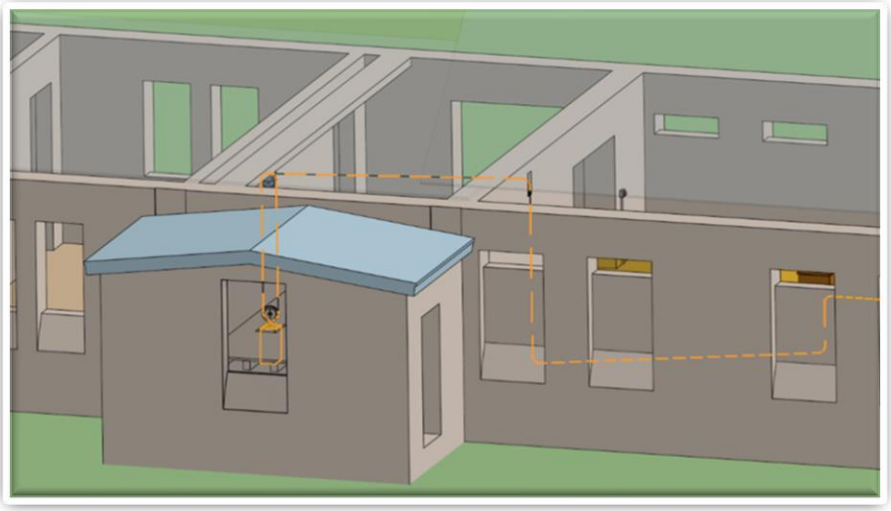
Location of the Clock Drive Weights Simon Brink



The Equatorial Drive design group has identified that the original location for the drive weights was likely in the mirror polishing room, not on the south side of the south pier as originally thought!!! This is confirmed via a reference in the *Mercury Newspaper of Thursday 29th. July 1869 "The Great Melbourne Telescope".*

"Adjoining the telescope chamber is a polishing room, 25 feet by 12 feet, the floor of which is on the same level as that of the observing room. In one corner of the room is the well for weights of the telescope clock, and ponderous looking things they are."

The clockwork drive cable is currently thought to have run down under the Great Melbourne Telescope room floor via the small rectangular cut out in the floor, then headed south, run up the south wall inside the photographic room, passed through the wall via a cable pulley, still embedded into the wall. (See photo below}

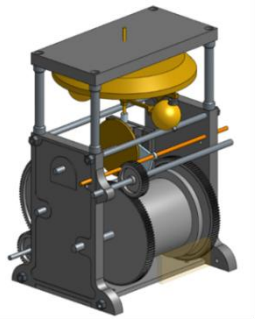
The pulley alignment identifies the likely position of the weights as hanging from the large beam that runs across the south side of the polishing room.

Currently a 4 fall system is proposed, with drive weight of around 5 hundred weight (227kg) see photo below.

Cable pulley 

 Drive weight

Clockwork Drive

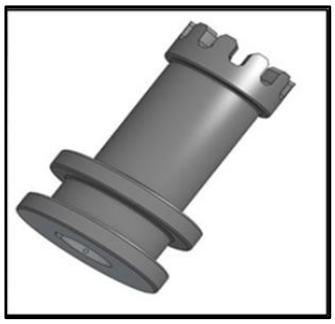


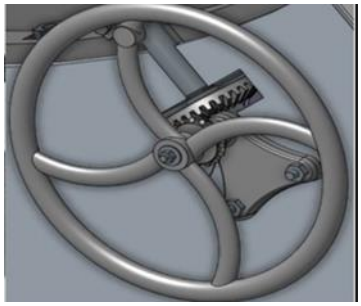
The clockwork drive design progressed significantly in 2021 thanks to fantastic work by Amanda Tang, assisted by Tony Dunning, Barry Clark and the Equatorial Drive Design Group. The gear ratios, shaft positions, governor geometry, speed adjustment cams and cable drum size are now well progressed and consistent with historic photos.

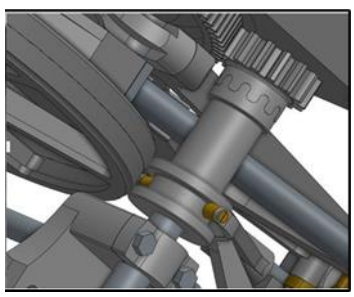
Detailed design of various components is ongoing.

The Skill of the Team's Designers and Draftspersons, is shown below where information is taken from a photo, scaled to size and reproduced modeled in 3D, after which, the item can be 3D printed so it can be tested in situ, or manufactured as a piece of The Great Melbourne Telescope puzzle.

Photo **3D model**







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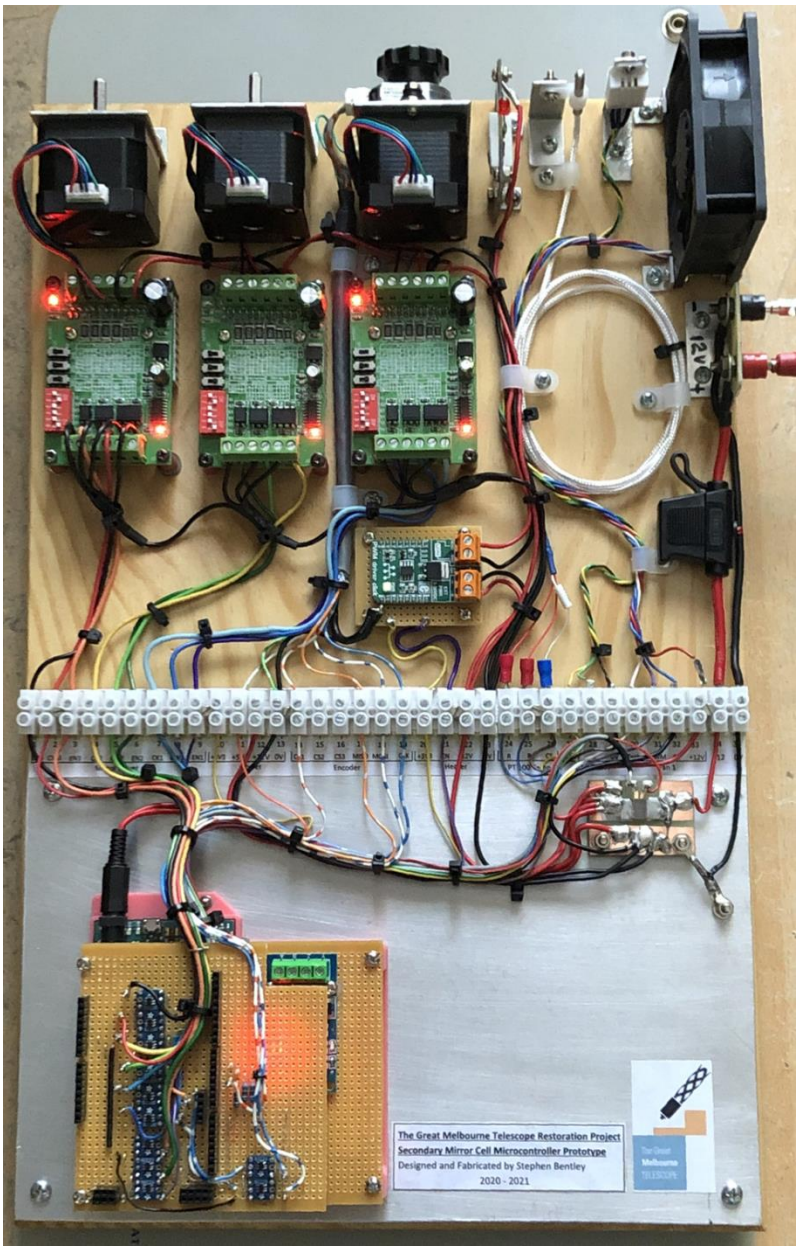
Secondary Mirror Cell Microcontroller Prototype

Steve Bentley

The almost complete secondary mirror cell microcontroller prototype.



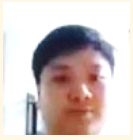
All hardware shown has been tested and is operational.

The Arduino microcontroller software continues to be optimised.

MAKING A LEAP FROM AN INTERN TO A VOLUNTEER

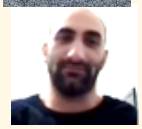
The Great Melbourne Telescope Restoration Project has provided an opportunity for around twenty-five young, highly skilled, tertiary students to put some of their learning into action and fulfil their course requirements.

Many have now completed their internships and moved on, but a few have decided to transition to volunteers. The project extends a huge thankyou to these volunteers including the following in 2021:



Andrew Ankadjaja
Progressed designs of the turret system from basic concept to a completed functional design, recently departing to commence of full-time employment.

Shu Faleel
Continuing to assisting with designs for the load relief system, declination axis movement and electromechanical system, as time permits.



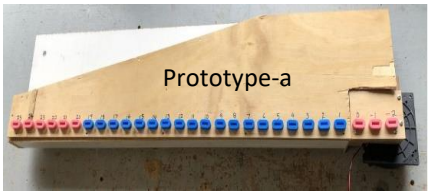
Louis Hosni
Progressed electromechanical drive designs for the polar and declination axis movement between ongoing work commitments.

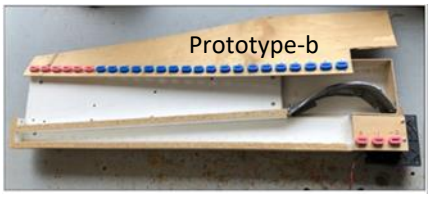
Jordan Taylor
Assisted with the secondary mirror cell and electromechanical designs up until recent commencement of full-time work.

Jess Widjaja
Working, between employment commitments, on the design of the link drive.

Steve Bentley at his work bench

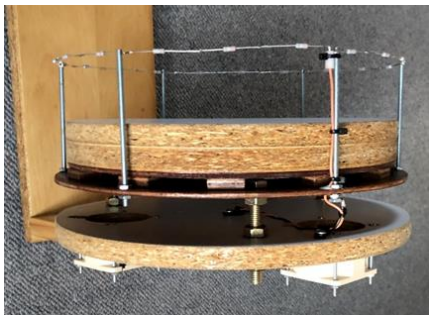
Plenum Prototype Steve Bentley





In the telescope there will be 4 of these plenums arranged in a circle around the front face of the primary mirror. They will blow air across the optical face of the mirror. The air is eventually drawn into the gap between the baffle and the central hole in the mirror. The mirror optical face airflow has a dual purpose. One is to provide mirror cooling to stabilise the mirror temperature with respect to the ambient, but also to improve optical "seeing". Recent research has revealed if the warm air just above the optical surface of the mirror is disturbed it breaks up what is defined as a boundary layer and light is less distorted through the layer of air. Without airflow, a mirage effect can occur blurring the image.

Secondary Mirror Cell Wooden Mock-up for Airflow Evaluation



The set of photos show Steve Bentley's mock-up of the full assembly of the Secondary Mirror Cell including the full-scale baffle (made from plastic not carbon fibre).

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GREAT MELBOURNE TELESCOPE 2021 RESTORATION DESIGN SYMPOSIUM WEDNESDAY 15TH. DECEMBER

MORNING SESSION:

10.00am – 10,15am – Welcome/Introduction. Professor Fred Watson AO.

10.15am – 13.15pm – Mechanical Drive Systems.

AFTERNOON SESSION:

1.15pm – 3.15pm – Optical Systems.

3.15pm - 3.30pm – Q&A Session and Close.

FORMAT:

Short 5-minute presentations on designs progressed through 2021 by team members.

LOCATION: Virtual on ZOOM

To register interest, get the Zoom link, and receive the program, please email Simon Brink: sbrink@museum.vic.gov.au

Hope to see you there, 15 December.