Module 7: Telescopic Vision Aids, Part 2
Custom Mounted Telescopes

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1. Make sure the patient is under the current care of an eye doctor and has a current refraction

2. Identify the patient’s visual goals

3. Determine the magnification required

4. Demonstrate the impact of illumination

5. Select the appropriate vision aids for the goals identified

6. Train the patient in the use and care of the chosen vision aid

7. Schedule a follow-up visit
Telescopic Vision Aids...

...can be used for any task at any distance.

...can be used for spotting or extended viewing.

...work primarily based on the principle of angular magnification.
• What they are
• How they work
• How to use them
• What types are available
• What are they made for
What is a Custom-Mounted Telescope?

A telescope that is drilled and mounted in the user’s eyewear.
Telescopes can be custom-mounted:

1. For binocular or monocular use
2. For viewing of distant or near objects
3. For spotting or extended viewing of objects
What is a bioptic telescope?

A bioptic telescope is a custom-mounted telescope that allows for two lines of sight, one through the telescope and the other through the carrier lens.
Why use a custom-mounted telescope?

The user wants one device allowing them to view two different distances with different magnifications.
Considerations in choosing a telescope to custom-mount:

- Application
- Telescopic power required
- Cosmesis
- Ergonomics
Keplerian Telescopes:

- Multi-element design
- Not as bright
- Longer barrel
- Heavier
- Challenging to fit
- Typically focusable

- Broad power range – up to 10X
Galilean Telescopes:

- Simple 2-lens design
- Bright
- Shorter barrel
- Lighter weight
- Easiest to fit
- Typically afocal

- Limited power range (< 5X)
Why are Galilean telescopes easier to fit?
- They possess a virtual, internal exit pupil

Why are Keplerian telescopes challenging to fit?
- They possess a real, external exit pupil
Applications considerations for custom-mounted telescopes:

- Is a binocular or monocular system required?
- At what distance(s) is the object to be viewed?
- Is a focusable telescope required?
- What will the mounted telescope be used for?
Cosmesis and ergonomic considerations for custom-mounted telescopes:

- Is a miniaturized telescope desirable?
- Exit pupil size and brightness of image
- Weight of monocular systems
- Comfort of extended wear and carrier frame
Characteristics of a good carrier frame:

1. Rigid but flexible
2. Strong bridge
3. Long temples*
4. Nose pads appropriate for weight of system
5. “B” measure sufficient
Telescopes can be custom-mounted in any of 3 positions:

- **Bioptic for Distance**
- **Full-Diameter**
- **Bioptic for Near**
Superior Bioptic Positioning is for distance spotting tasks with hands free. Ideal for: Driving

\[ x^o = h (mm) * 2 \]
Use of bioptic telescope in superior position for driving

Monocular bioptic telescope for driving
Inferior Bioptic Positioning is for near spotting or extended tasks with hands free. Ideal for: reading, handicrafts, vocational.

Angle of declination = 2 x (mm)
Use of bioptic telescope in the inferior position for reading or other hands-free near work.
Full-Diameter Positioning is for extended viewing tasks at distance with hands free

Ideal for: watching TV
Use of full-diameter telescope for reading with cap or viewing distant objects
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Binocular Pupillary Distance

Monocular Pupillary Distance

Major Reference Point
Monocular or Binocular mounted telescopes for distance need only be centered on the wearer’s pupillary axis.
Binocular mounted systems for near present greater challenges when measuring and marking the eyewear to be fabricated.
Distance from spectacle plane to object at eye level

Plane of object

Angle of declination $x^\circ$

Convergence angle $y^\circ$

Linear distance from spectacle plane to object
Mark near pupils and desired position of telescopes for near task.

Be sure to mark near pupils in the line of sight
Use of adhesive rings to mark telescope position allows for functional testing of:

1. Centration
2. Binocularity
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Major Reference Point

Bifocal

Binocular PD at Near

Optical Center of Bifocal

Binocular PD at Distant Gaze
Reviewing the differences between Galilean and Keplerian telescopes illustrates the relative ease of fitting Galilean telescopes over Keplerian.
Tips for custom-mounting telescopes:

1. Carrier eyewear should be fully fitted to the wearer **before** the telescope is mounted.
2. CR-39 is preferred carrier lens material.
3. If Rx is used in carrier, it should be incorporated in the telescope.
4. Tinting can improve cosmesis.
5. Beware of accommodative demands when using fixed focus telescopes.
Telescopic vision aids can be used to accomplish any task at any distance!

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Custom Mounted Telescopes

Advantages:
- Multiple task solution
- Working distance for near
- Hands-free for distance spotting

Disadvantages:
- Uncomfortable
- Conspicuous
- Limited field of view
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• What they are
• How they work
• How to use them
• What types are available
• What are they made for
Questions?
Thank You!