Lick Observatory
Mt. Hamilton, California

Basic Dimensions and Information on 120-inch Telescope

1. **BUILDING**
   a. Base structure reinforced concrete; 99 ft. outside diameter with 18 in. walls
   b. Base structure 35 ft. high from grade 0.0 ft.
   c. Height of dome from top of concrete to top of shutter 60 ft.
   d. Total height of building from grade 0.0 ft. = 95 ft.

2. **DOME**
   a. Outside diameter of dome 96 ft. 6 in.
   b. Outside dome cover ¼-inch steel spherically shaped plates
   c. thickness of dome shell 3 ft. with 2 ft. 9 in. air space for insulation
   d. Inner finish of dome corrugated aluminum shaped sheet with 3 inches of aluminum foil for insulation.
   e. Dome supported on thirty (30) 2-wheeled trucks.
   f. Main arch girders 5 ft. deep with 18 in. channels for top and bottom flanges and ¾-in. web plate.
   g. Weight of dome approximately 200 tons.

3. **TELESCOPE**
   a. Diameter of main mirror 120 in.(10 ft.)
   b. Focal length 600 in. (50 ft.)
   c. Camera speed f/5
   d. Auxiliary equipment:
      (1) prime focus camera for 5” and 7” plates
      (2) prime focus spectrograph with 4 in. square gratings
      (3) prime focus photometer
   e. Cassegrain spectrograph f/15
   f. Coude spectrograph:
      (1) 3-mirror system f/36
      (2) 5-mirror system f/38.7
   g. Mirrors:
      (1) 1st mirror 120” diameter x 16” thick (concave), 7740 lbs. weight
      (2) 2nd mirror 31”diameter x 4” thick (convex), 240 lbs. weight
      (3) 3rd mirror 24” wide x 50” long x 9” thick (flat), 1000 lbs. weight
      (4) 4th mirror 31” diameter x 5-1/2” thick (flat), 326 lbs. weight
      (5) 5th mirror 44” diameter x 6” thick (flat), 560 lbs. weight

4. **TELESCOPE TUBE**

a. Length 51 ft. 6 in., including prime focus cage
b. Prime focus cage 12 ft. OD x 8 ft. high, 5000 lbs. weight
c. Total weight 45 tons = 90,000 lbs., includes 12,000 lb. mirror cell and 7740 lb. mirror.

d. Tubes: upper truss 8” OD x 6-5/8” ID, seamless tubes; lower truss 8” OD x 7-1/2” ID, seamless tubes.
e. Balance weights 5 tons = 10,000 lbs. (in 4 units)

5. **FORK**

a. Two fork arms - 12 tons each (24,000 lbs)
b. One yoke – 33 tons (66,000 lbs).
c. Total weight – 57 tons (114,000 lbs)

(1) Plate thickness varies from 1-1/2” at center of yoke to 5/8” at arm tips.

(2) Bolted joints between fork arms and yoke, and yoke and polar axle are with pre-stressed bolts at approximately 70,000 psi.

6. **POLAR AXLE (all cast steel)**

a. North journal section – 84” OD, 4” wall thickness x 33” long
b. North center section – 82-3/4” OD, 2-1/2” wall thickness x 89” long
c. South center section – 82” OD, 1-3/4” wall thickness x 95” long
d. South journal section – 48” OD, 2-1/2” wall thickness x 62” long

This section includes south journal and carries thrust pad flange and right ascension gear journal.

e. Total weight – 34 tons (68,000 lbs.)
f. Total length – 23 ft. 3 in. (279 in.)

7. **OIL PAD BEARINGS**

a. Oil film thickness - .002 to .003 in.
b. Oil pressure – approximately 800-850 psi
c. Pad diameters:
    (1) North (2 pads) – 25-3/4” OD – 24” diameter
    (2) South (2 pads) – 16-3/4” OD – 15” effective diameter
    (3) Thrust (1pad) – 24” OD – 22-1/4” effective diameter
d. OD includes oil recovery channel
e. Oil flow per pad – approximately 1 gallon/minute
f. Oil viscosity approximately SAE 10 with high viscosity index.

8. **RIGHT ASCENSION WORM GEAR**
   a. Consists of two steel gears on single hub.
      (1) One gear for fast setting of telescope (slew speed)
      (2) One gear for celestial drive of telescope (tracking speed)
   b. Each gear has 720 teeth; 143” OD; .625 circular pitch
   c. Worms 5-1/2” OD, single thread, nickel bronze

9. **DECLINATION SPUR GEAR**
   a. A weldment with 605 teeth
   b. 121” pitch diameter and a 5 diametral pitch, 4” face width.
   c. Pinion 60 teeth with a 12” pitch diameter.

10. **DRIVES**
   a. Right ascension
      (1) slewing – 1-1/2 HP – speed 45 deg. per minute
      (2) set rate – ¼ HP – 77 seconds of arc per second of time (adjustable)
      (3) guide rate – 1/8 HP – 2-1/4 sec. of arc per second of time (adjustable)
      (4) tracking rate – 1/25 HP – 15 sec. of arc per second of time (adjustable)
   b. Declination
      (1) slewing – ¾ HP – speed 45 deg. per minute
      (2) set rate – ¼ HP – 77 sec of arc per second of time (adjustable)
      (3) guide rate – 1/8 HP – 2-1/4 sec of arc per second of time (adjustable)
      (4) lunar rate – 1/8 HP - .33 sec of arc per second of time (adjustable)
   c. All rates except tracking and slewing drive through Graham variable speed reducers giving remotely controlled rate adjustments.

11. **COUDE SPECTROGRAPH**
   a. Collimating mirrors 12” diameter x 2” thick, and 15” diameter x 3” thick (future).
   b. Collimated beam 6” diameter in one position and 9” diameter in extended position.
   c. Gratings – approximately 8” x 10” – 15,000 and 22,500 lines/inch.
   d. Dispersion range 32.8 A/mm to .85 A/mm.
   e. Cameras:
      (1) 20” focal length mirror dia. 29-1/2” x 7” – Plate holder size 1”x 6”
      (2) 40” focal length mirror dia. 31-1/2” x 5” – Plate holder size 1-1/4” x 8”

(3) 80” focal length mirror dia. 36” x 8” – Plate holder size 2” x 12”
(4) 160” focal length mirror dia. 50” x 91” – Plate holder size 2” x 24”