Chapter 3

SOON (AN/FMQ-7) TELESCOPE SYSTEM

3-1. Purpose. This chapter provides a general overview of the basic telescope system and the location and use of its major components. For additional details see T.O. 31M1-2FMQ-7-1.

3-2. General Description. The AN/FMQ-7 telescope assembly begins with a 10-inch objective lens mounted at the poleward end of the telescope tube (see figure 3-1). This tube provides a 210-inch focal length and is evacuated to prevent image distortions. A 36-inch focal length lens is at the bench end (see figure 3-4) of the telescope tube to provide a 2-inch diameter image and improve the image definition. Beam splitters and scanner mirrors at the extreme left of the telescope bench, receive the image from the collimator tube and direct it, proportionately, to the upper and lower paths (see figure 3-2). These two light paths supply light to photographic, video and visual observing subsystems.

a. Photographic observations are made using the Acme movie camera in the upper light path or the 35mm still camera which can be attached to the monocular eyepiece in the lower light path.

b. Video observations are available from four 9-inch monitors near the operator's position and from two 23-inch monitors placed at other convenient positions.

c. Visual observations are available through the H-alpha and white light eyepieces, as well as on the white light projection board.

3-3. H-Alpha Subsystem. The purpose of the H-alpha subsystem is to isolate the hydrogen-alpha wavelength (6562.8 Angstroms) from the upper light path. The H-alpha line provides a profile of chromospheric features such as flares, prominences, spicules and filaments. Two viewing scales are possible; full disk or large scale. Being instantaneously interchangeable, they provide the optimum for observing features on the disk and limb.

3-4. B_2 Subsystem. This subsystem uses the same filter as H-alpha, but employs different prefilters and polaroids to isolate the magnesium wavelength (5172 Angstroms). The B_2 system can be used to view umbra, penumbra and facula the most extreme in solar activity can be observed at this wavelength on the TV monitors.

3-5. White Light Subsystem. The white light subsystem takes 8% of available light, reflected off an optical wedge, and sends 4% to the sunspot image board and 4% to the telescope guider. The sunspot image board, where sunspot drawings are made, is located on the upper portion of the optical bench to the operator's right. A tracking guider is located directly above the sunspot image board. This guider measures the level of light coming from the sun by means of photo-electric cells and, if sufficient light is received, commands the telescope drive modules to track the sun automatically.

3-6. The Spectrograph Subsystem. The spectrograph provides the multiwavelength capability of the SOON system. This subsystem employs the lower light path and allows the study of a particular wavelength.

3-7. The Magnetograph Subsystem. The magnetograph subsystem graphically depicts magnetic field strengths of active solar regions.

3-8. The Computer Subsystem. The computer racks (Figure 3-3) contain the central processor, some of the peripheral devices and the interfaces for all peripherals within the computer subsystem. The major components of this subsystem are:

a. The Center Processor. This device is the "heart" of the computer subsystem. It executes the automatic operation of the telescope system through the peripheral devices.

b. The I/O Extender. Because of the number of input/output devices used in the SOON system, an I/O extender is needed so the central processor can control all the peripheral devices.

c. The System Console. This device is the analyst's primary interactive device. It allows the analyst to "converse" with the central processor.

d. The Disc Drive. This mass storage device is used to store both computer software and solar data.

e. The Magnetic Tape Drive. This device archives the SOON data on magnetic tape as it's collected.

f. The Graphics Terminal. This device prints paper copies of programs, calibration tables and other data. It may also be enabled as an interactive terminal.

g. The Digital Clock. The time registered on this device is read by the central processor to set its internal clock.

h. The Analog-to-Digital (A/D) and Digital-to-Analog (D/A) Converters. These devices provide the interface between the central processor and the telescope hardware, e.g., the mirrors, lenses, etc.

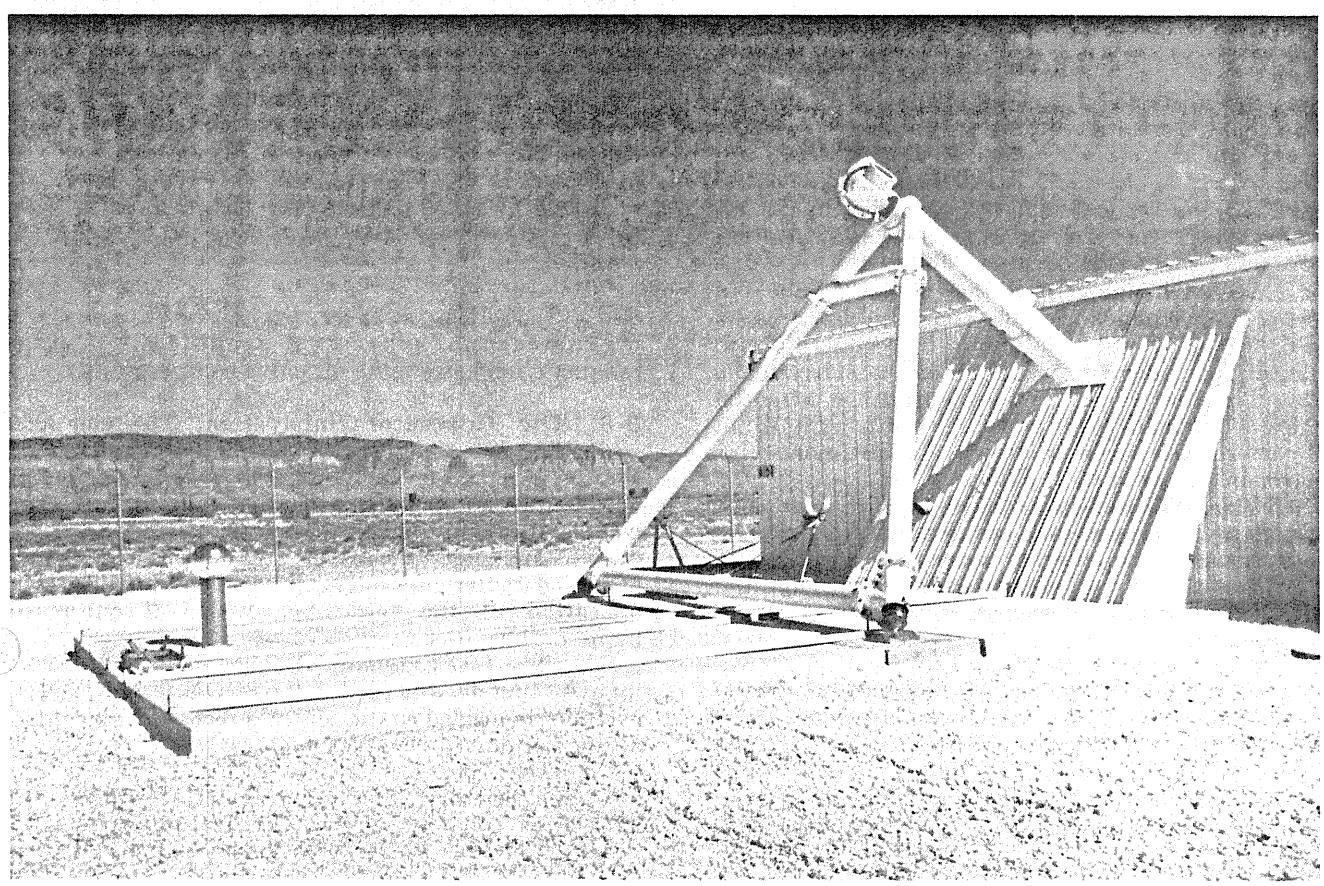

Figure 3-1. Evacuated Telescope Tube and 10″ Objective Lens.

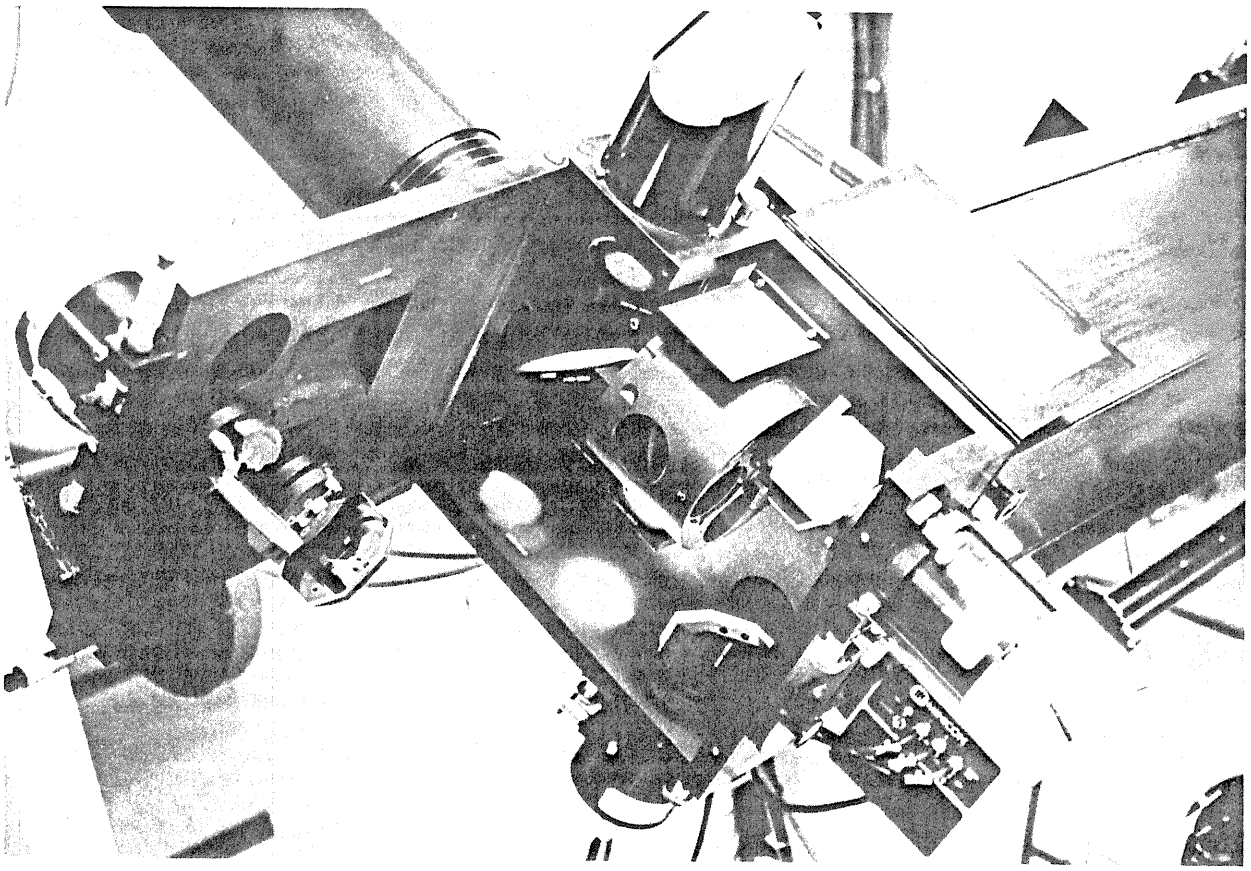

Figure 3-2. Beamsplitter and Scanner Mirrors.

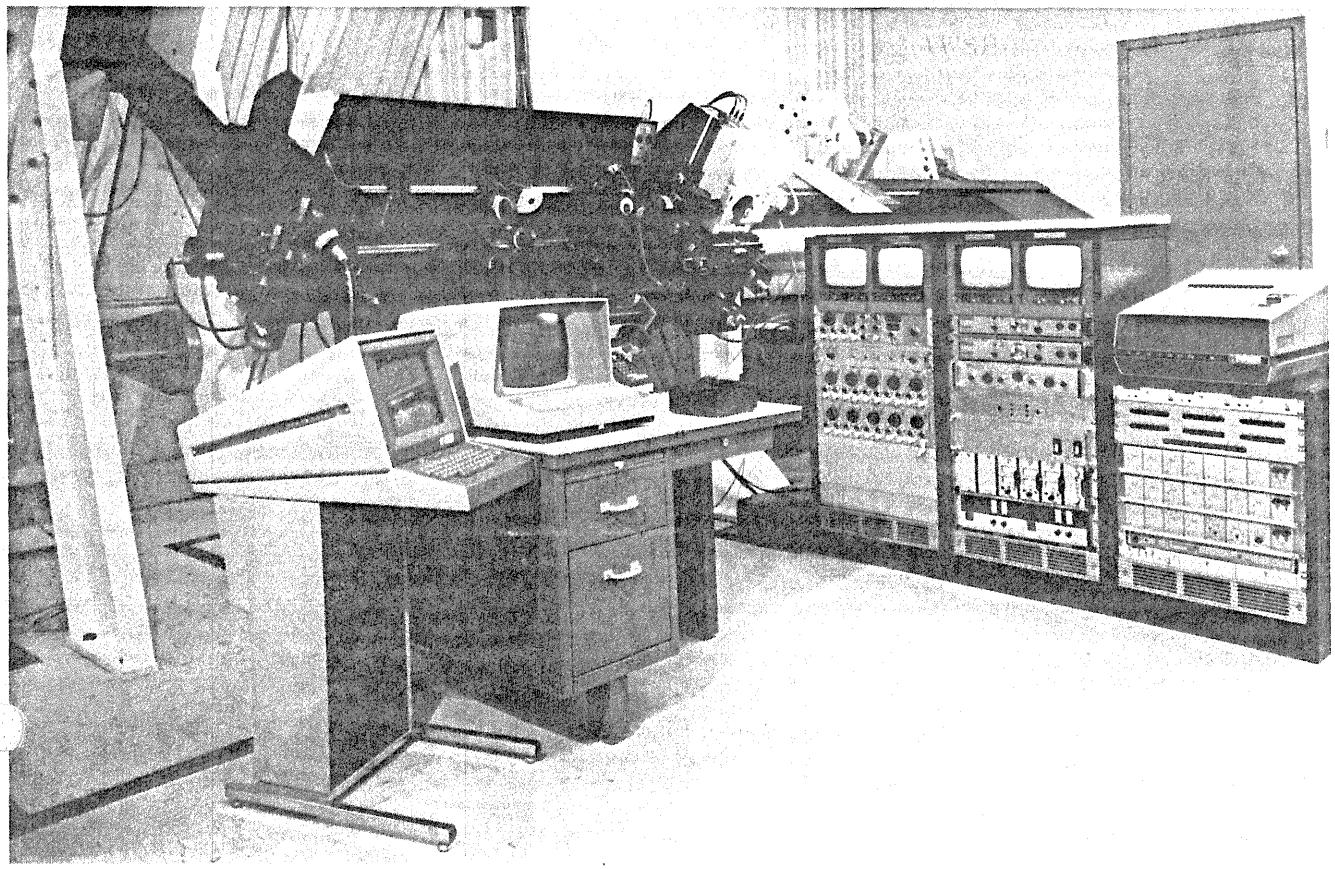

Figure 3-3. Computer Mainframe.

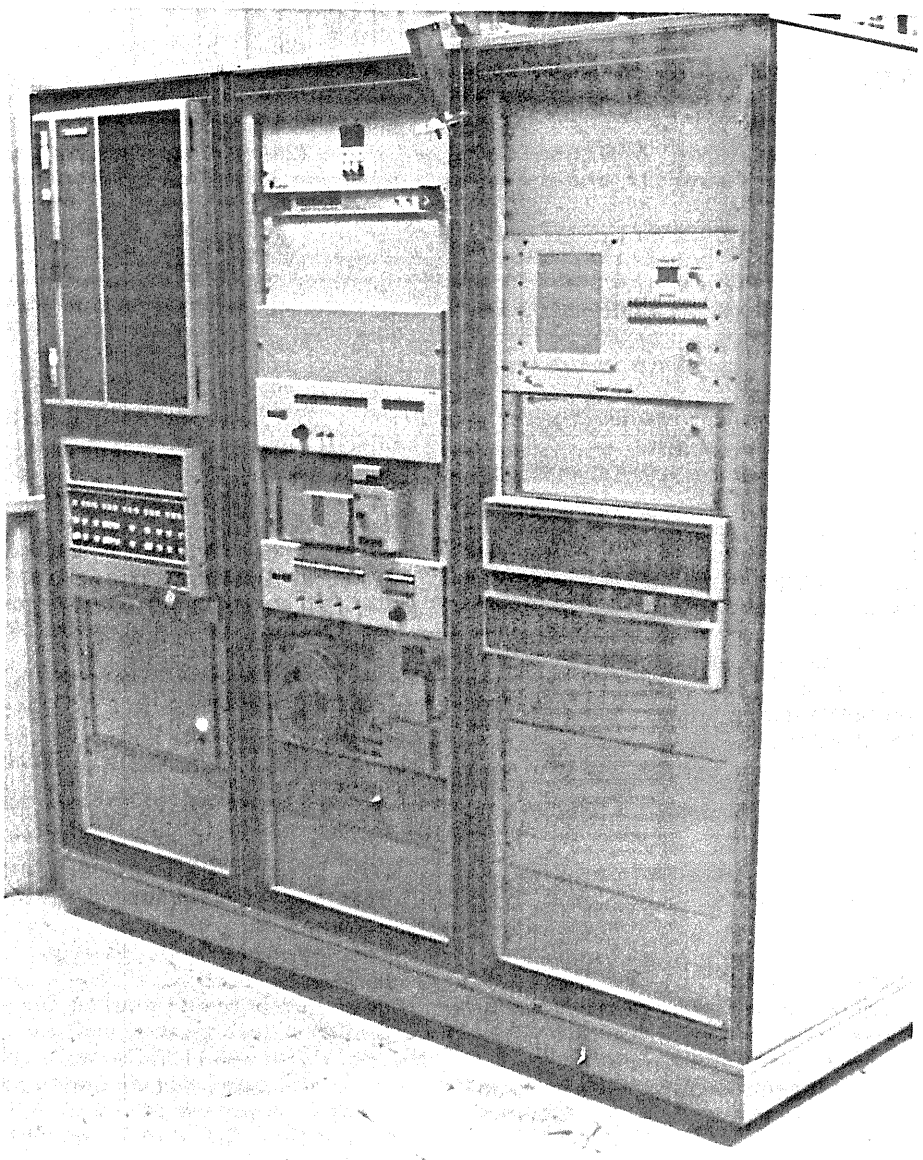

Figure 3-4. Telescope Optical Bench, Analyst's Console, and TV Racks.