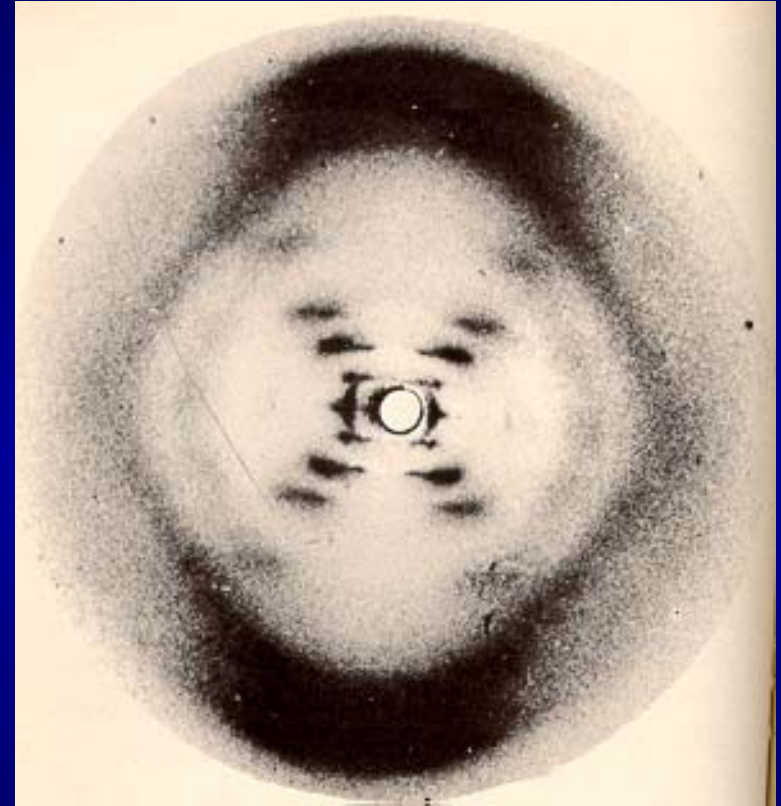


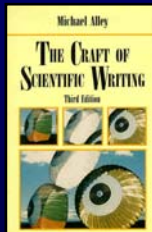
# Illustration:

## The Meshing of Words With Images

Keep it as simple as  
possible, yet no simpler  
Albert Einstein



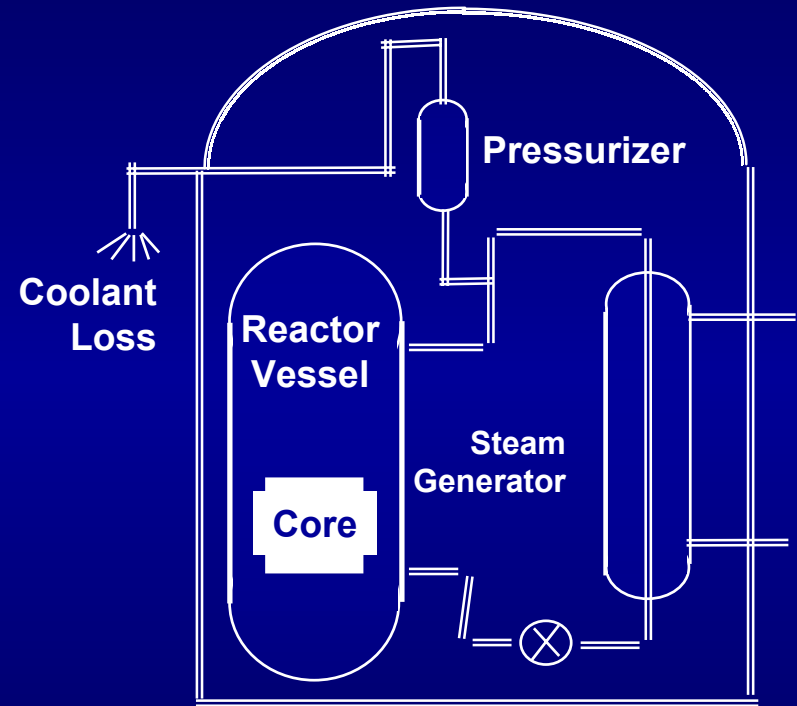
X-ray photograph of DNA  
[Rosalind Franklin, 1952]



# Two types of illustrations exist: tables and figures

**Table 1. Reactor power levels in Chernobyl accident [Wolfson, 1991].**

Date	Time	Power Level
4/25	1:00 am	3200 MW
4/25	2:00 pm	1600 MW
4/25	11:10 pm	1600 MW
4/26	1:00 am	30 MW
4/26	1:19 am	200 MW
4/26	1:23 am	2,000,000 MW

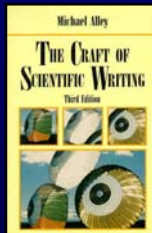


**Figure 1. Simplified diagram of nuclear reactor [Wolfson, 1991].**

# Tables can present words as well as numbers

**Table 2. Sequence of events in the Chernobyl accident [Wolfson, 1991].**

Date	Time	Power Level	Event
April 25	1:00 a.m.	3200 MW	Operators begin power descent
April 25	2:00 p.m.	1600 MW	Power descent delayed for 9 hours Emergency core-cooling system disconnected
April 25	11:10 p.m.	1600 MW	Operators switch off automatic control Power descent resumed
April 26	1:00 a.m.	30 MW	Power minimum reached
April 26	1:19 a.m.	200 MW	Operators pull rods beyond allowable limits Operators start two additional coolant pumps Operators violate coolant flow limits
April 26	1:23 a.m.	2,000,000 MW	Power surges by factor of 10,000 in 5 seconds



# When presenting numerical data, you choose between tables and graphs

Table 2. Blood glucose levels [Carlson, 1982].

Time (hour)	Normal (mg/dl*)	Diabetic (mg/dl)
midnight	100.3	175.8
2:00	93.6	165.7
4:00	88.2	159.4
6:00	100.5	72.1
8:00	138.6	271.0
10:00	102.4	224.6
noon	93.8	161.8
2:00	132.3	242.7
4:00	103.8	219.4
6:00	93.6	152.6
8:00	127.8	227.1
10:00	109.2	221.3

\* decaliters/milligram

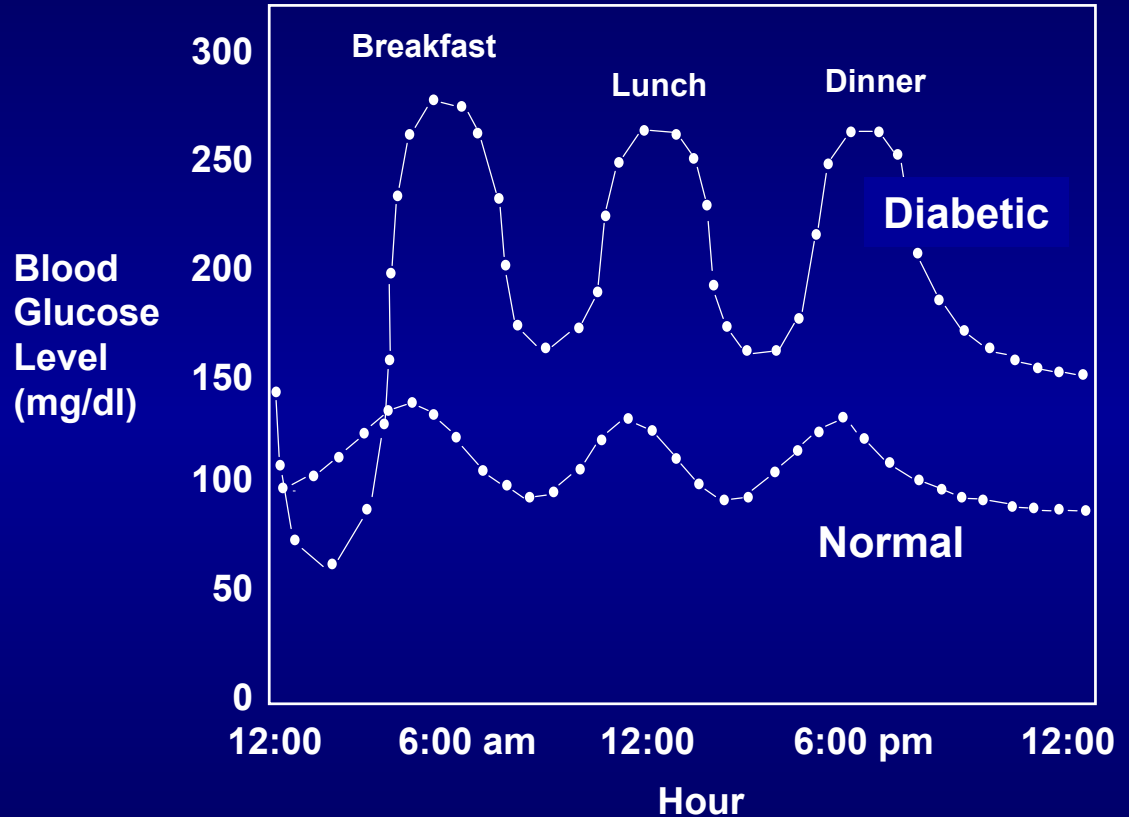
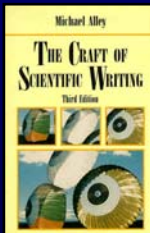
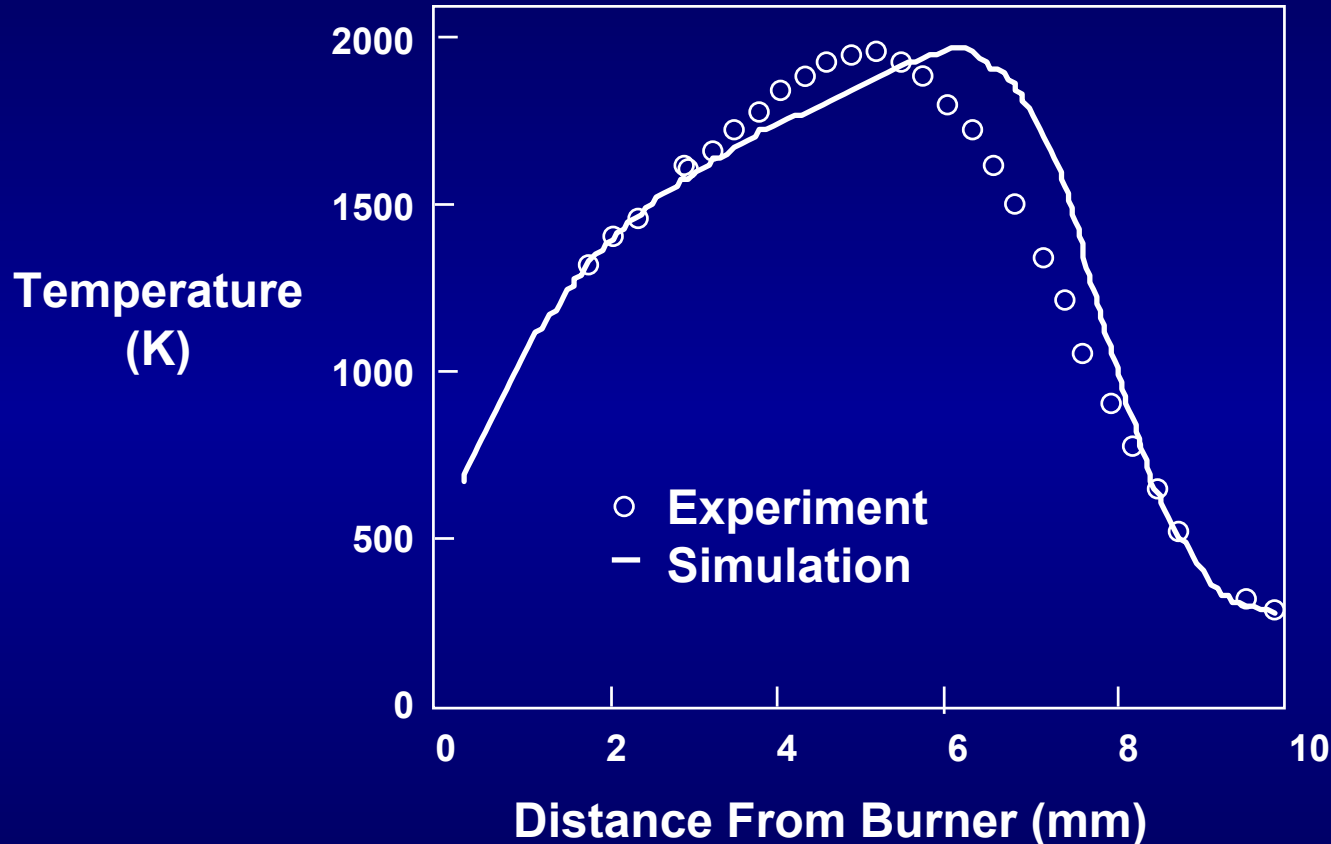


Figure 11. Blood glucose levels for normal individual and diabetic [Carlson, 1982].



# Line graphs are common in engineering and science



**Figure 3. Computational and experimental temperatures for laminar diffusion flames [Sandia, 1987].**

# Bar graphs compare wholes

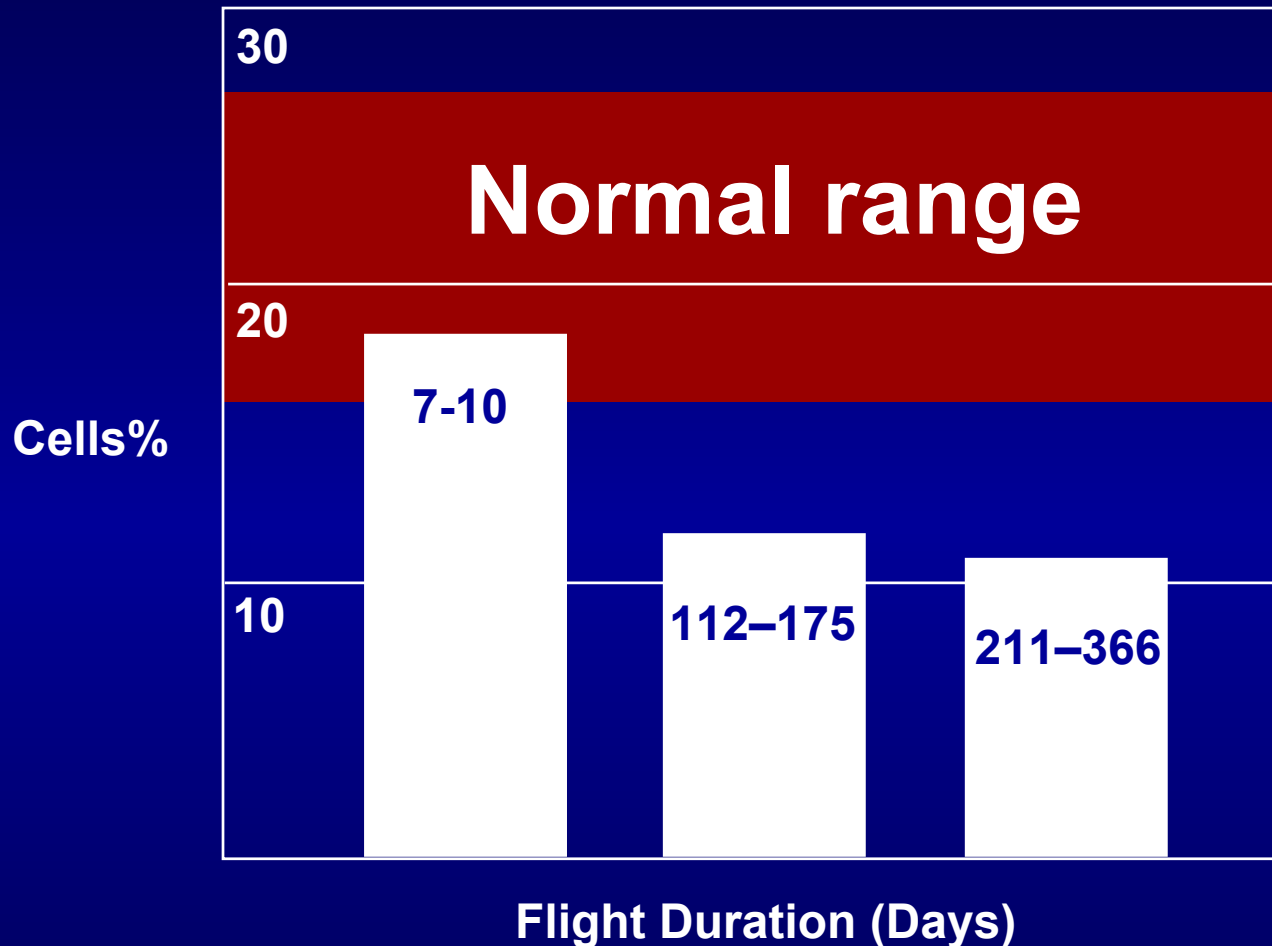
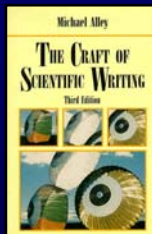
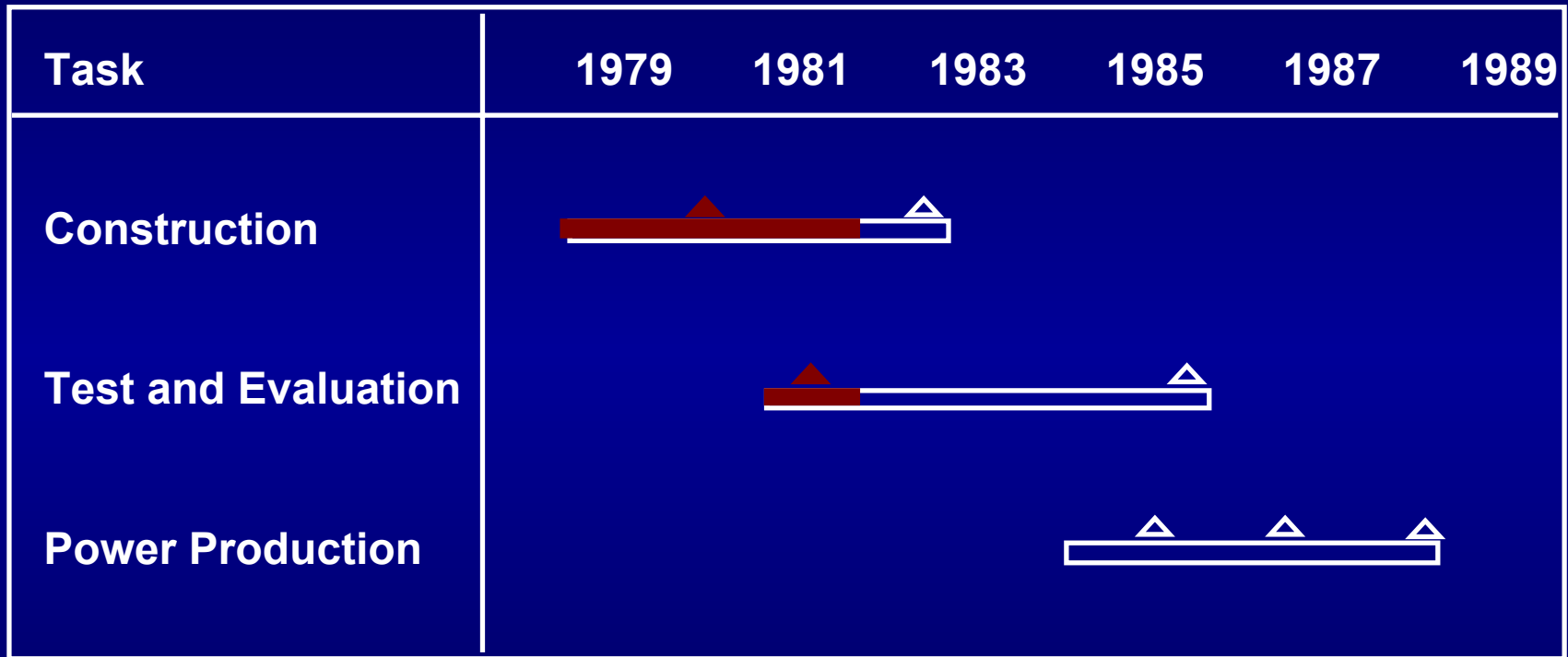


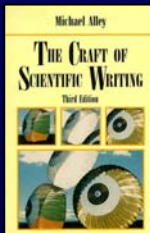
Figure 4. Response of T-cells in cosmonauts after short-term and long-term flights [Konstantinova, 1991].



# Gantt charts are a type of bar charts



**Figure 5. Schedule for the construction, evaluation, and production phases of the Solar One Power Plant.**



# Pie graphs compare parts of a whole

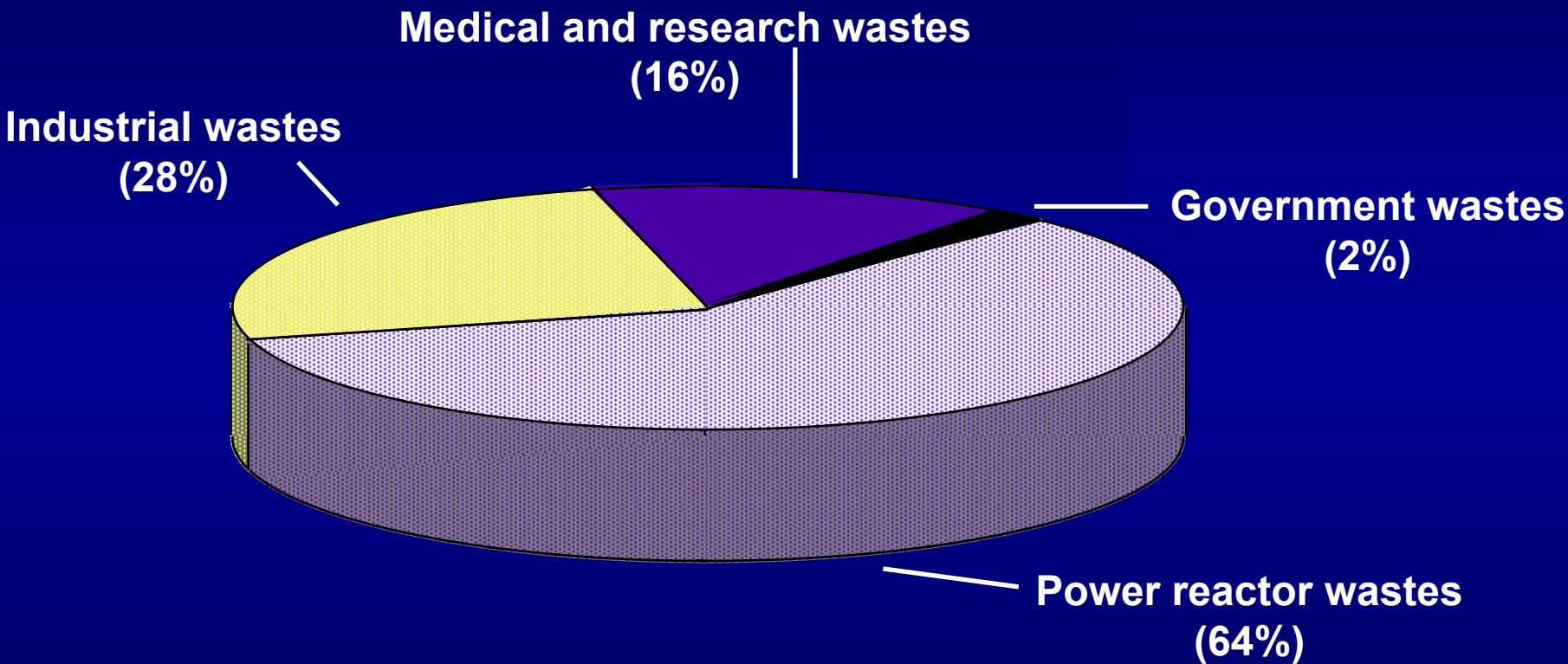
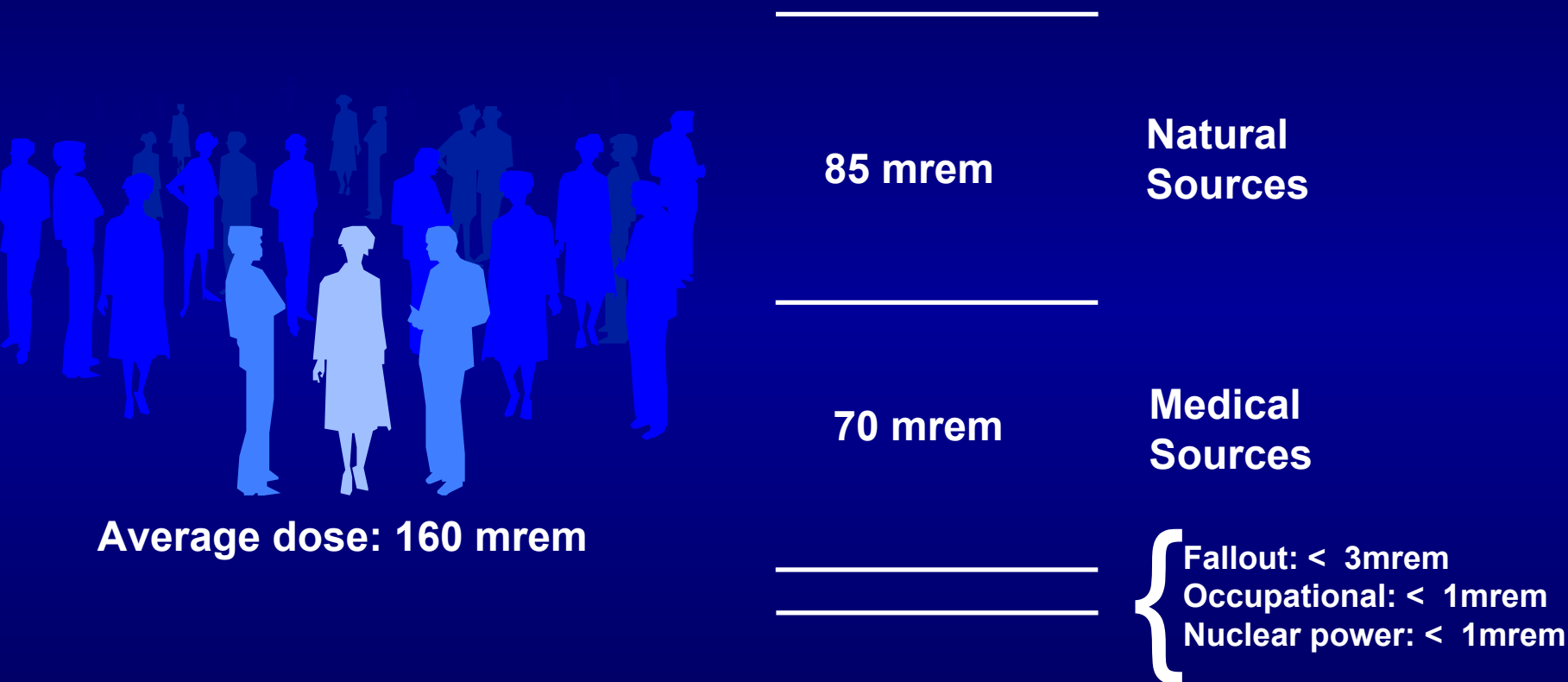


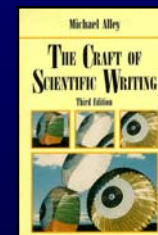
Figure 5. Volume of low-level nuclear wastes from various sources [League, 1985].



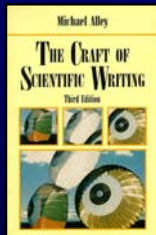
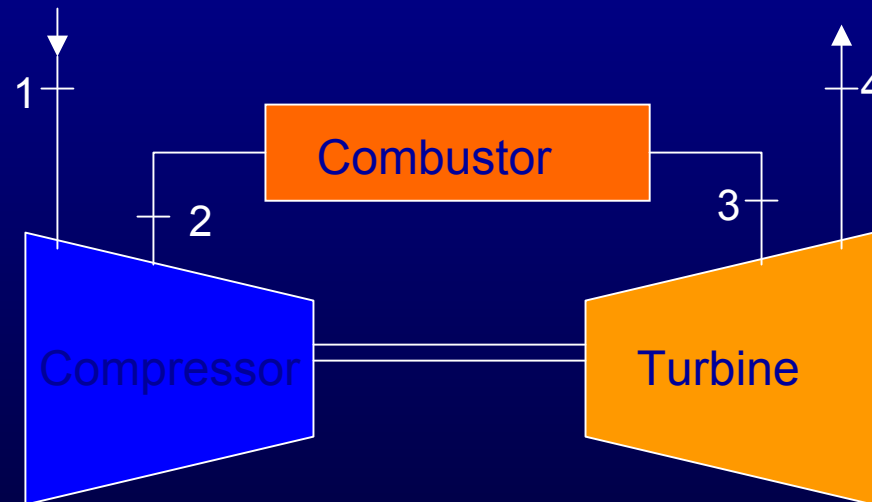
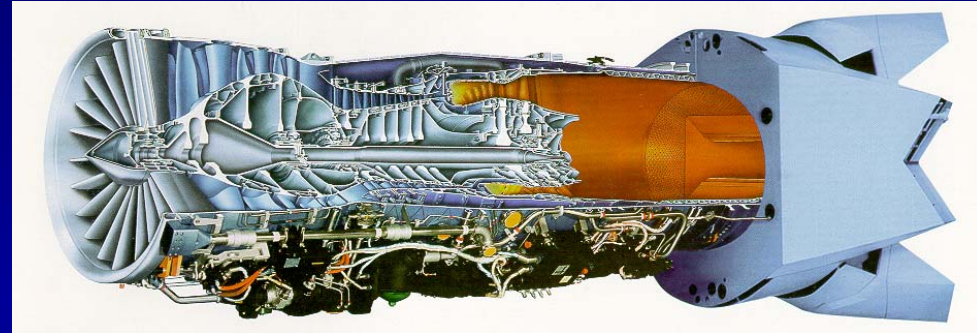
# Graphs come in many forms



**Figure 6. Estimated annual dose of radiation in the United States [GPU Nuclear, 1985].**



# When presenting images, you choose between photographs, drawings, and diagrams



# The main advantage of photographs is realism



59 seconds

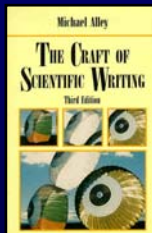


59.5 seconds



60 seconds

Figure 2. Space Shuttle Challenger, from about 59 seconds to 60 seconds into launch (January 28, 1986). On the right rocket, flame first becomes visible and then impinges on tank.



# One advantage of drawings is control of detail

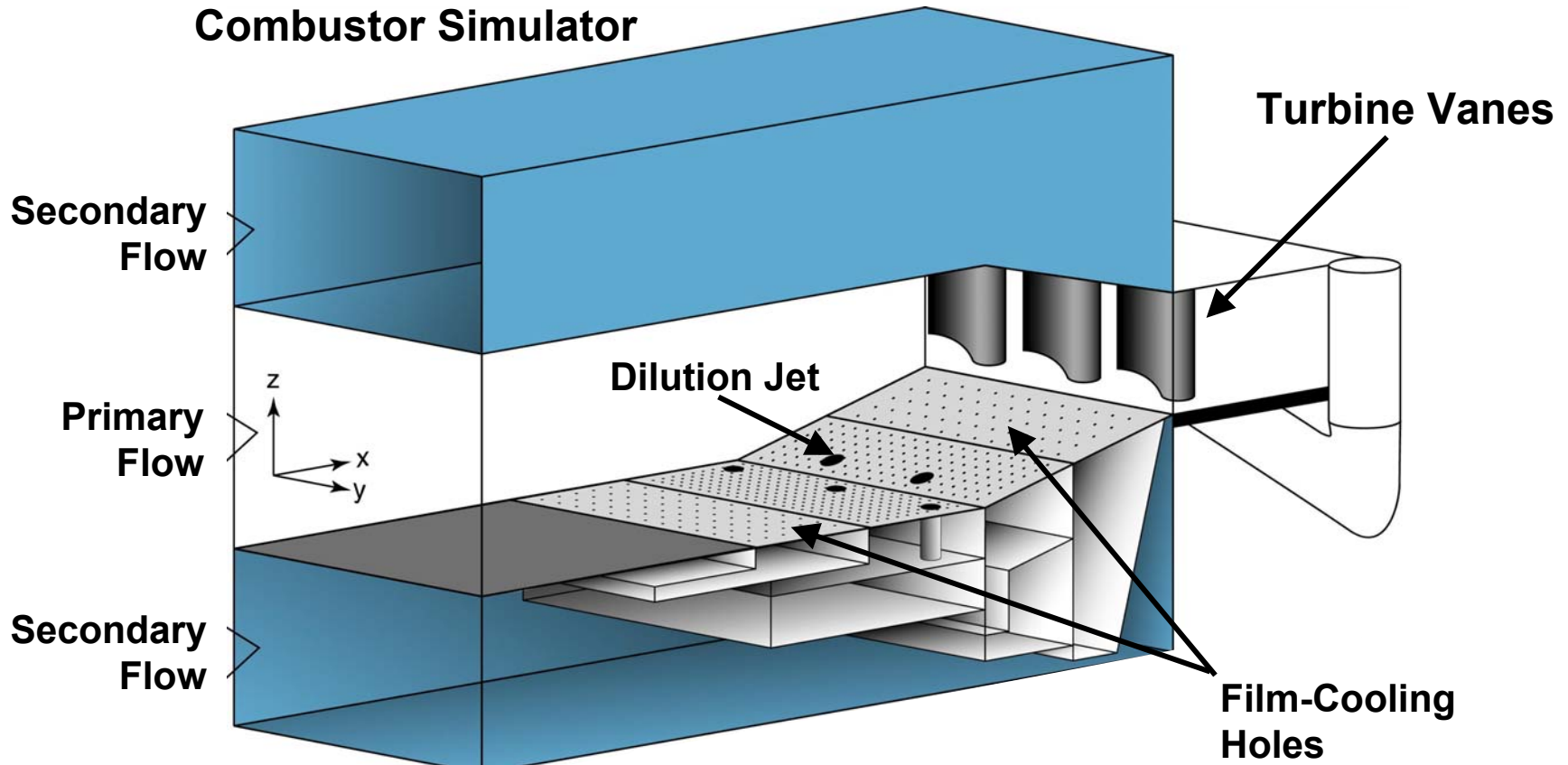


Figure 5. Wind tunnel experiment at Virginia Tech for evaluating film-cooling designs for the blades of gas turbine engines [Thole and others, 2000].

# The main advantage of a diagram is the ability to show flow of a variable through a system

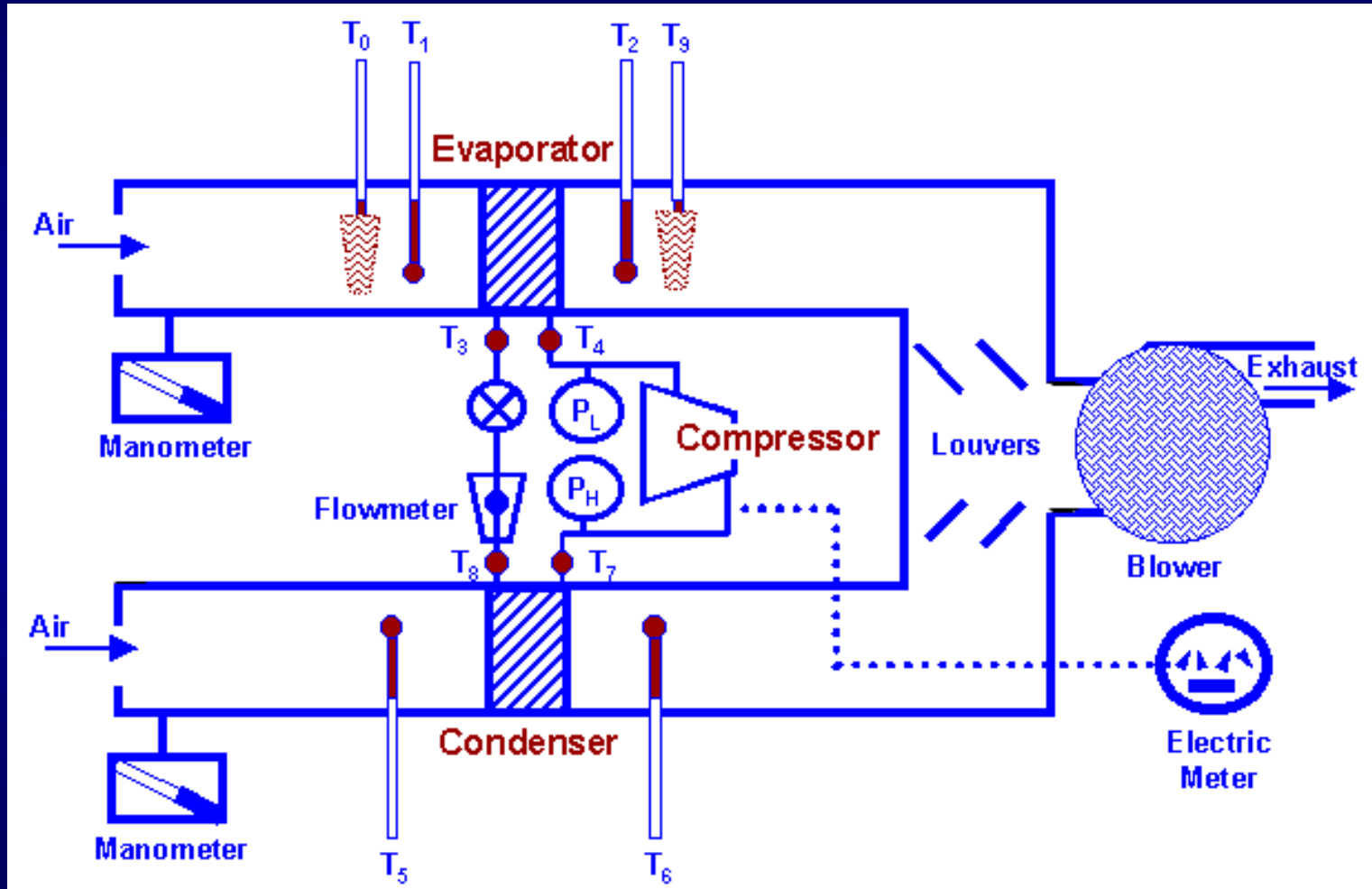


Figure 8. Schematic of test stand for evaluating components of an air conditioner design.

# Scientists and engineers often use illustrations that are too complex for the text

The thermal storage system stores heat in a huge, steel-walled tank. Steam from the solar receiver passes through heat exchangers to heat the thermal oil, which is pumped into the tank. The tank then provides energy to run a steam generator to produce electricity. A schematic of this system is shown in Figure 5.

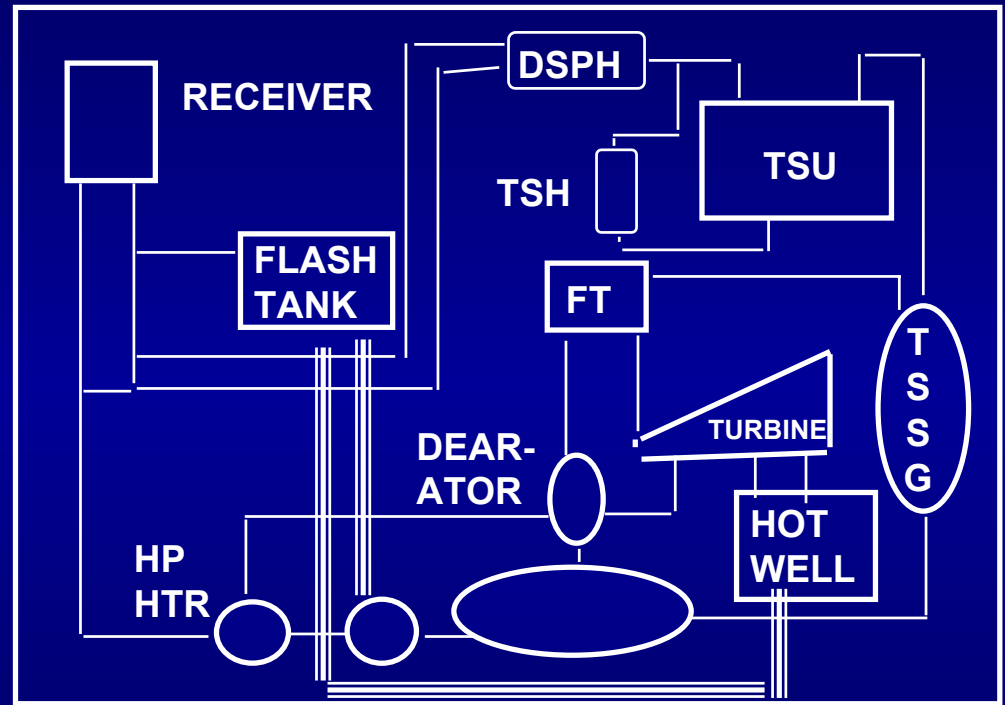


Figure 5. Schematic of thermal storage system.

# The precision of the illustrations should reflect the precision of the text

The thermal storage system, shown in Figure 6, stores heat in a huge, steel-walled tank. Steam from the solar receiver heats a thermal oil, which is pumped into the tank. The tank then provides energy to run a steam generator to produce electricity.

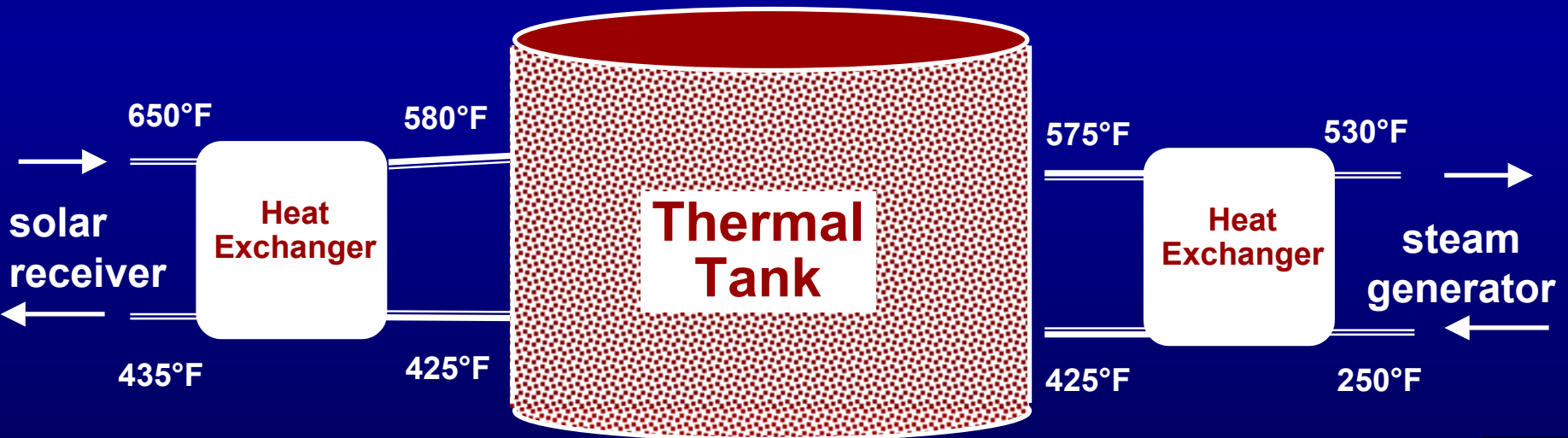
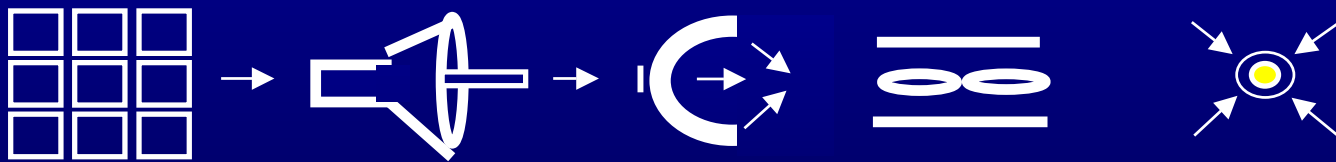


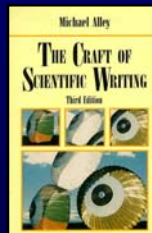
Figure 6. Schematic of thermal storage system for the solar power plant.

# For clarity, you should introduce and explain illustrations in the text

..., as shown in Figure 7.



**Figure 7. Title of figure. Some formats allow you extra sentences to explain unusual details.**





# Inconsistencies between text and images disrupt fluidity

The testing hardware of the rocket shown in Figure 8 has five main components: camera, digitizer, computer, I/O interface, and mechanical interface. Commands are generated by the computer, then passed through the I/O interface to the mechanized interface where the keyboard of the ICU is operated. The display of the ICU is read with a television camera and then digitized. This information is then manipulated by the computer to direct the next command.

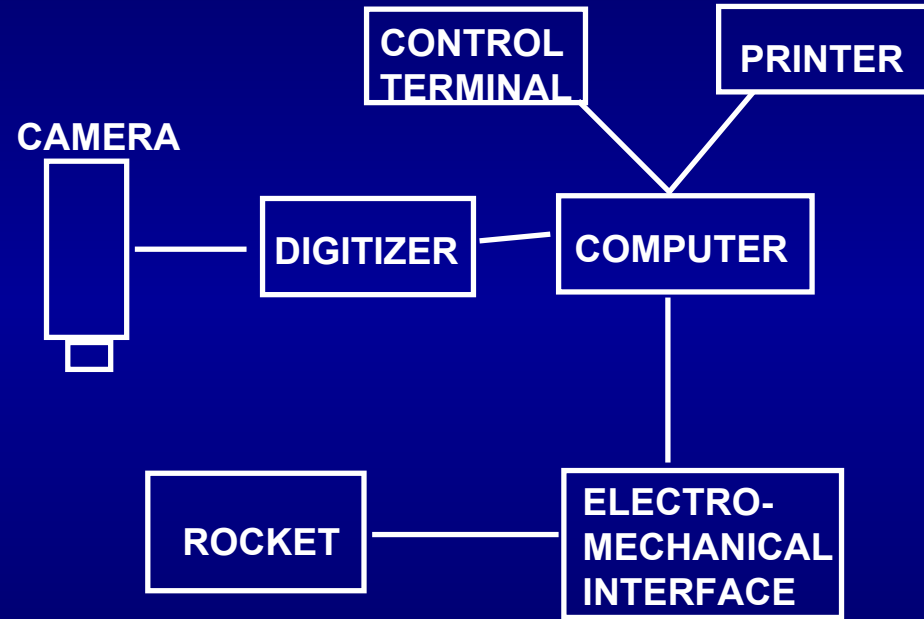
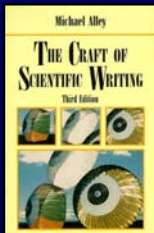
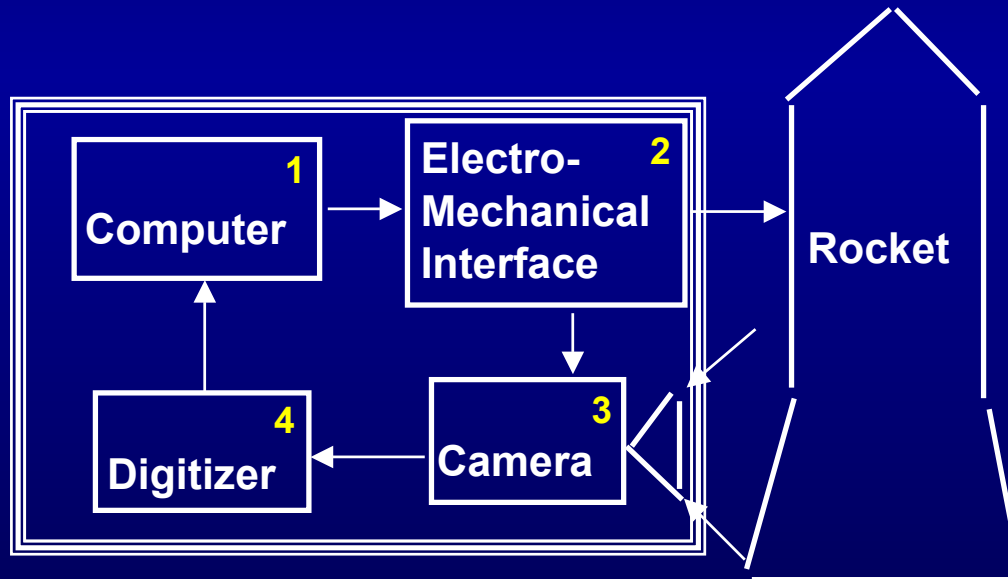


Figure 8. Testing hardware.



# Illustration is the meshing of words with images

Our system for testing the launch controls of the rocket consists of four main parts: computer, electro-mechanical interface, camera, and digitizer. In this system (shown in Figure 9), the computer generates test commands to the rocket through the electro-mechanical interface. The test results are read with a television camera, and then digitized. The computer receives the information from the digitizer, and then directs the next test command.



**Figure 9. System to test launch controls for rocket.**