Features of the SLR 2000 Facility: Climate Control, Dome Movement Control, System Security

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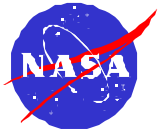
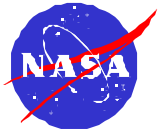
12th International Workshop on Laser Ranging
Matera, Italy
November 13-17, 2000



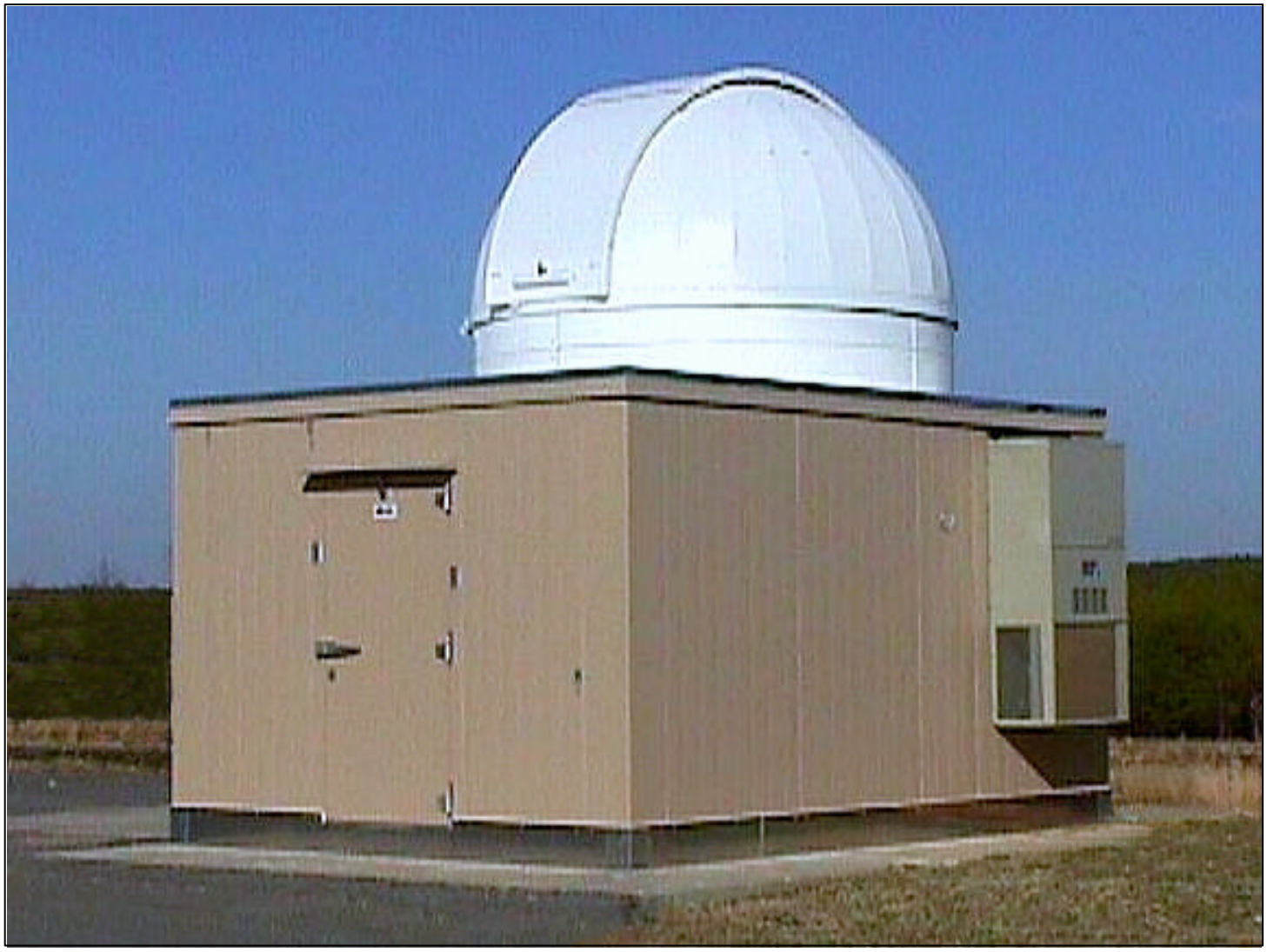
Climate Control, Dome Movement Control, System Security

- The SLR 2000 facility will require dependable subsystems that minimize the possibility of failure and provide duplicity where practical to optimize system operation

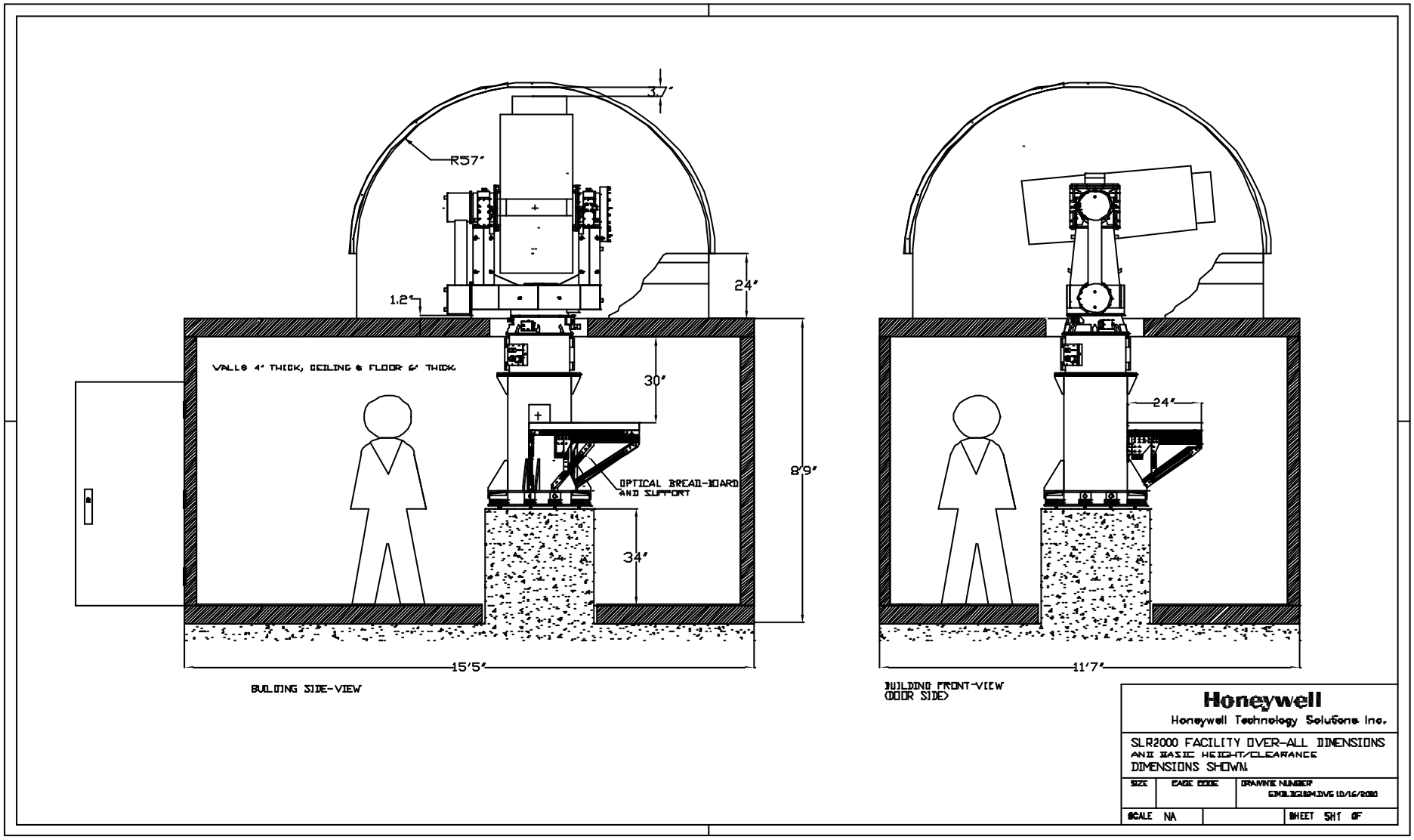
- These subsystems will secure the system in the event of failure or vandalism



SLR 2000 Shelter



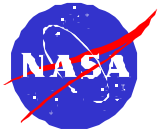
Shelter Diagram



Shelter Interior

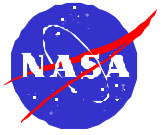
Climate Control

- A robust temperature and humidity control system for the shelter interior will be employed. One that is reliable, yet also easily serviceable regardless of system location
- Both the interior of the shelter and the interior will receive atmospheric control



Climate Control Shelter Interior

- The heating, ventilation, and air conditioning of the SLR 2000 shelter is provided by two self contained, identical wall mounted units
- The shelter HVAC units have an electronic master control system. This control system provides for a redundant operation and equal operating time on both units
- Operation of the HVAC units alternates on a 24 hour basis, switching automatically to the other unit in the advent of a failure

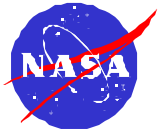


BARD Air Conditioning Unit

BARD Control Unit

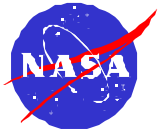
Climate Control Shelter Interior

- Designed for one unit to operate at a time and completely carry the cooling load
- Each unit is rated at 18,300 BTUH cooling capacity
- The electrical rating is 230/208 VAC, 60 Hz, single phase
- The electric reheat is rated at 5 kW
- Motor phase protectors are used to safeguard the system
- Designed to maintain temperature at 70° F, ± 2° F



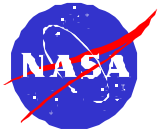
Climate Control Dome Interior

- **To maintain the integrity of the telescope optical alignment, and optimize the systems capability to track once the dome is open, temperature and humidity will be controlled inside the dome**



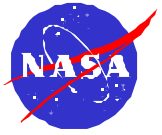
Climate Control Dome Interior

- **Dome, while closed, interior temperature will be maintained slightly higher than the outside temperature**
- **This will minimize temperature differential between the gimbal/telescope and outside air and minimize condensation**
- **Also, this will maintain integrity of telescope optical alignment by keeping within temperature design parameters**
- **Dome interior temperature will be maintained between 0 degrees Fahrenheit and 100 degrees Fahrenheit**



Climate Control Dome Interior

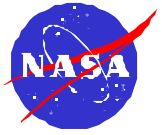
- Atmosphere of dome interior will be controlled through the use of centripetal air movers which compress the air and remove moisture
- Air from the interior of the dome will be passed through the centripetal air movers once to remove the moisture, and then a second time through the centripetal air mover condensation coils to heat the air before it is passed back into the dome
- A humidity and temperature monitoring system will be used to control the air dryer system



Dome Movement

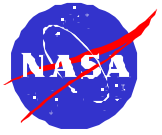
- **Rotational movement and dome opening / closing will be managed by a microprocessor based control system**

- **This system will command a drive mechanism employing dual, heavy duty brushless motors and electric clutches that add durability and provide redundancy**



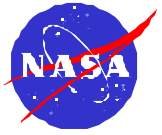
Dome Movement

- Dome rotation is provided by two .25 HP brushless DC Servo motors via two transmissions and clutches
- On the fly pointing accuracy during periods of large velocity and acceleration is about 5°. Fine pointing accuracy for non-moving targets is ¼ degree
- An incremental optical encoder tracks the position of the dome
- Proximity switches are used as “home” locators



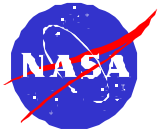
Dome Movement

- Use of mControllers allows for a “smart” peripheral design
- Offers the least impact on POP CPU time while allowing maximum functionality
- Modular design

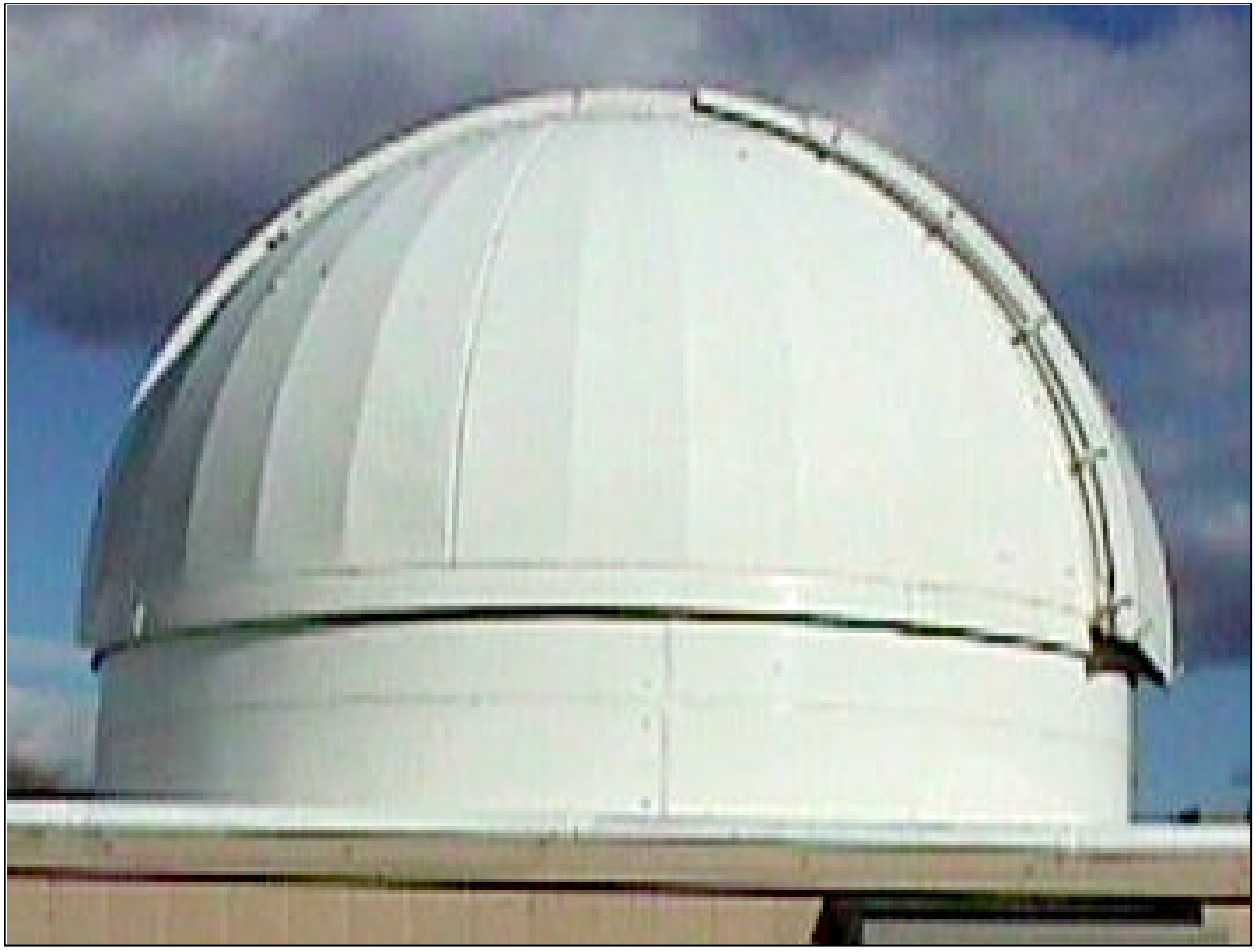


Dome Movement

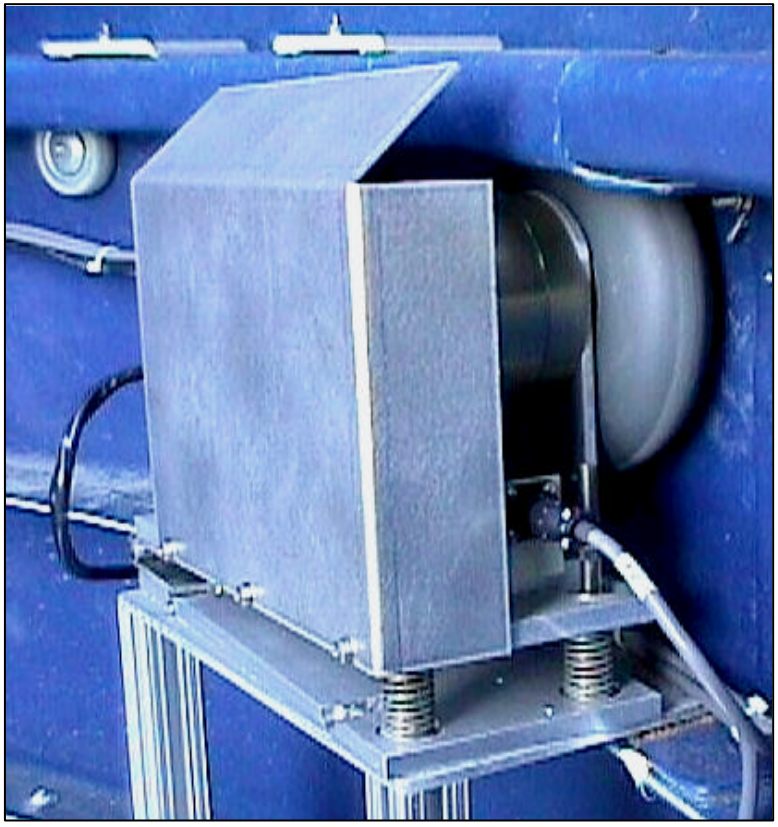
- **Both manual and computer method will be used for controlling the dome**
- **A storage battery with a separate mController located on the moving portion of the dome allows for emergency closure of the shutter in the event of a power failure or loss of communication**
- **Quick response to pointing commands. The maximum velocity of the dome is 20° per second, with an acceleration of 15° per second^2**
- **Dome can operate (with reduced performance) on one motor**



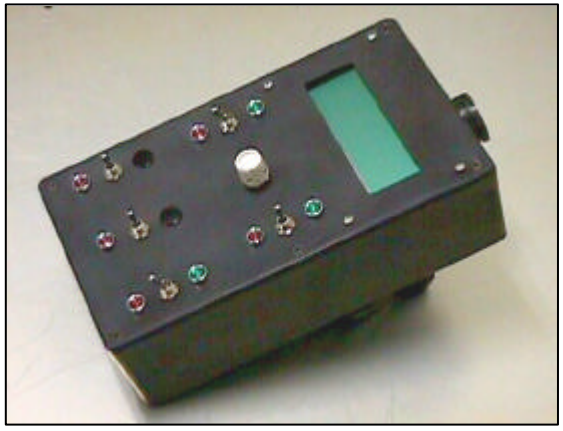
Dome



Dome Azimuth Motor Drive

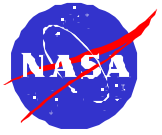


Dome Azimuth Controller Development System and Hand Controller



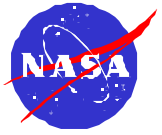
System Security

- System security will be handled in part by the SLR 2000 Health and Safety computer system
- Video cameras, motion sensors, door interlocks, smoke alarms, and vibration sensors will provide security information to the Health and Safety system
- The system will allow remote monitoring and alerts as well as intelligent protocols that can secure the system if needed



System Security

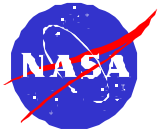
- Three video cameras will provide monitoring of the compound and surrounding area, the dome area, and the shelter interior
- Interlocks will be installed on the compound gate, the station door, roof access, and the dome area hatchway
- Smoke detectors, temperature and humidity sensors, and water sensors will be located in the dome area as well as the electronics room



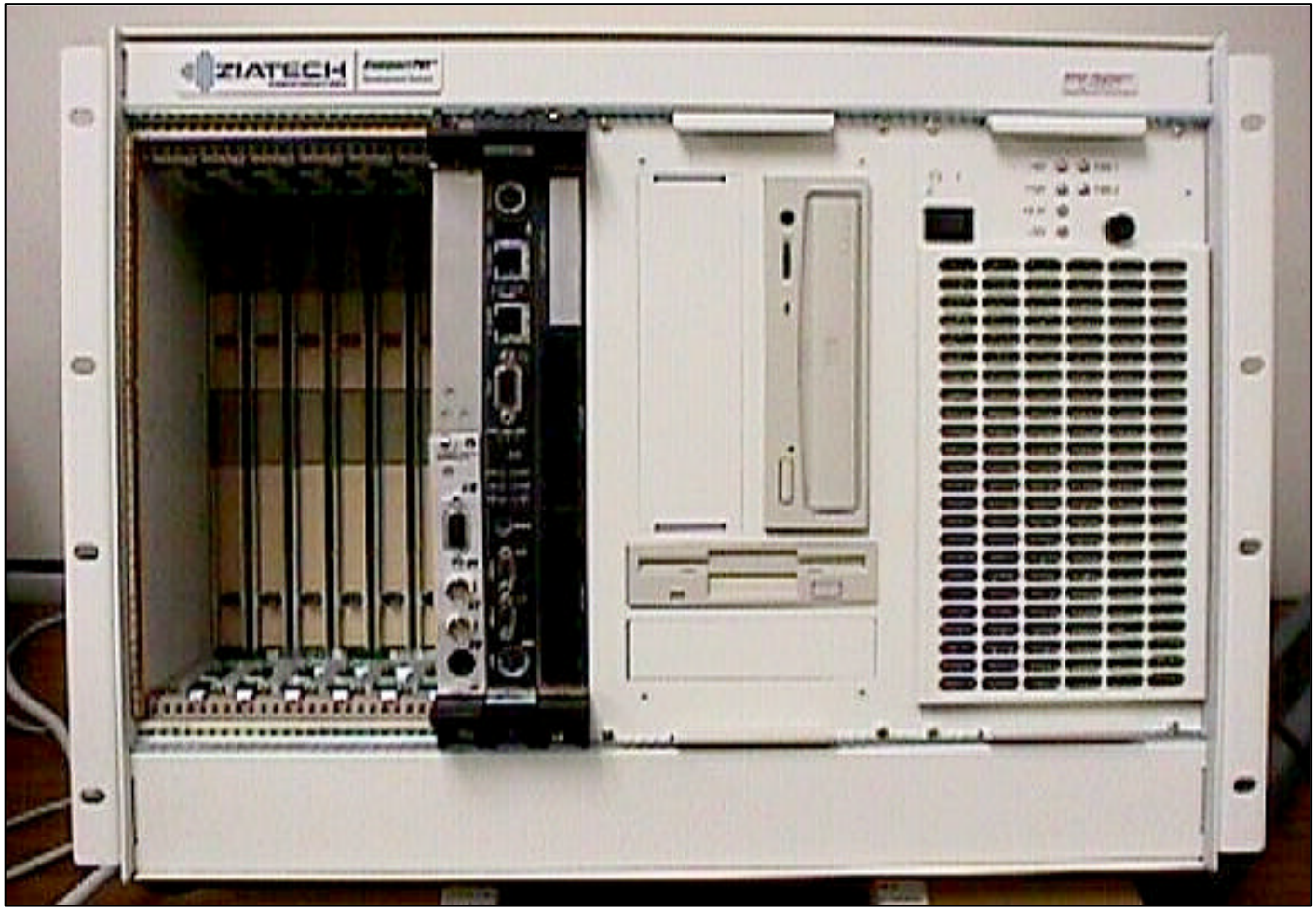
System Security

- **Status of all sensor devices will be available remotely via the Health and Safety computer**

- **Health and Safety system will be vital in the remote troubleshooting of system failures, the remote monitoring of system security, and the remote monitoring of the overall “health” of the SLR 2000 system**

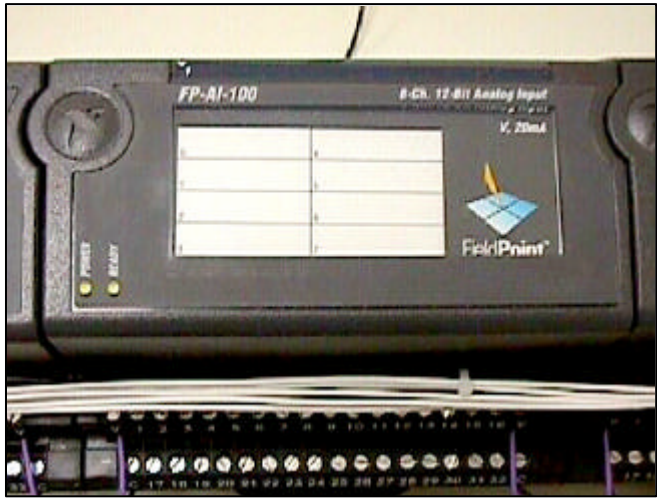


Health & Safety Controller and Peripherals



Health & Safety Peripherals

RS 232/485
Network Interface



8 Channel
Analog Input Module

Temperature & Humidity
Transmitter

Health & Safety
Surveillance Camera