Grounding Policy

1. General Requirements

The WIYN Observatory sits atop Kitt Peak on one of the most active lightning sites. Grounding of equipment is not well defined since the ground potential varies dramatically when electrical storms are in the area. Severe electrical storms can change the ground potential by several tens of volts indicating the mountain top ground reference floats considerably with respect to the power grid reference.

2. Grounding Philosophy

It is anticipated that all systems will be shielded and grounded in a layered fashion with a single point ground between layers. The single point ground will be short and heavy and close to the major current carrying components.

3. Building Grounds

The building will provide the outer most layer or shell for grounding. Care will be taken to insure multipoint grounds between all exterior aluminum panels and the structure supporting them. Air terminals will be mounted on the tops of the enclosure and control buildings to locally discharge the atmosphere. Bare copper cable from the air terminals will be run down the sides of the enclosure exterior in several locations around the building and connected to a copper cable surrounding the circumference of the observatory and buried in the ground. To this grounding ring eight 18 inch square copper plates will be connected and buried 36 inches deep in 12 locations equally spaced around the circumference of the observatory. At least two of these plates will be buried above or in the septic tank's leach field. Rebar within the foundation and pier will be connected to this grounding grid completing the Faraday shield. The integrity of the grounding system depends on adequate panel and superstructure low resistance contact.

A UFer ground will be connected to the electrical service neutral and ground which will tie the entire area to a unified ground potential.

4. Electrical Service Grounds

All electrical service grounds will be tied to the distribution panel ground which is in turn tied to the UFer ground and the exterior grounding grid. This ground is also tied to the mountain power ground.

If different parts of the mountain are at different potentials, which is likely during a severe thunder storm, large currents could flow in the power distribution ground causing potential differences between grounds at opposite ends of the distribution system. This will not pose a problem as long as there are no other electrical connections to other mountain sites.

4.1 General Service, Mountain Distribution Power

Mountain distribution power grounds will all come back to the mountain distribution power panel on the enclosure ground floor. The panel ground will be connected to the grounding grid as mentioned above.

4.2 UPS-1 Control System Power

UPS-1 power grounds will all come back to the UPS power distribution panel on the enclosure ground floor. The UPS-1 provides protected power to the computers and control system. The panel ground will be connected to the grounding grid as mentioned above.

4.3 UPS-2 Drive System Power

UPS-2 power grounds will all come back to the UPS power distribution panel in the mechanical room. The UPS-2 provides protected power to the main drive amplifiers and motors. The panel ground will be connected to the grounding grid as mentioned above.

5. Dome Grounding

Dome panels will be grounded with copper grounding straps and screws at several locations around the periphery of the panels to the steel support structure. The steel support structure will be welded together making a low resistance path to all currents impinging on the dome. The structure will be grounded to the dome rail and building through high conductance material slip blocks sliding along the rail in at least four places around the dome and rail.

6. Telescope Grounding

The telescope will be connected to the UFer ground and building grounding grid. Electrical service running to the telescope will be grounded as stated in section 4.

6.1 Science Instrument Grounding

Power to the Science Instruments will be provided through power supplies located off the telescope generally. The outer cases will be grounded to the telescope potential. The inner radiation shields will be grounded to the signal grounds, as well as all internal electronics. Different power supply grounds will be connected in common at the analog to digital converters servicing the instrument. This common signal will be floating with respect to all potentials except supply voltages. The signal common will be connected to the chassis grounds in a single point at the electronics back plane.

6.2 IAS Grounding

Power to the IAS will be provided through power supplies located off the telescope. The outer cases will be grounded to the telescope potential. Different power supply grounds will be connected in common at the IAS electronics back plane. This common signal will be floating with respect to all potentials except supply voltages and will be connected to the chassis grounds in a single point at the electronics back plane.

6.3 Hydra Grounding

Power to Hydra will be provided through power supplies located under the skirt of the telescope generally. The outer cases will be grounded to the telescope potential. Different power supply grounds will be connected in common at the back plane. This common signal will be floating with respect to all potentials except supply voltages. The signal common will be connected to the chassis grounds in a single point at the electronics back plane.

7. Control System Grounding

Power to the control system will be provided through power supplies located near where it is needed, generally. The outer cases will be grounded to the telescope potential. The internal electronics will be grounded to the signal grounds. Different power supply grounds will be connected in common at the analog to digital converters where possible. This common signal will be floating with respect to all potentials except supply voltages. The signal common will be connected to the chassis grounds in a single point at the electronics back plane.