

**Basic Electronics and Troubleshooting  
Instrumentation**

**Course Code: USGS-HIF-ID1081**

Hydrologic Instrumentation Facility (HIF)  
Stennis Space Center, MS  
**1-800-382-0634**

**Agenda**

**TUESDAY**

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08:00           **Introductions and Welcome to HIF**

08:15           **Tour of HIF Facilities**

09:00           **Basic Electronic Principles**

- Voltage
- Current
- Resistance
- Ohm's Law
- Power
- Kirchoff's Laws
- Parallel and Series Circuits
- Equivalent Circuits

11:00           **HIF Repairs and Service**

11:10           **HIF Instrument News**

11:20           **Class Photograph**

11:30           **LUNCH**

12:30           **Meters and Measurements**

- Meter Types
- Voltage Measurements
- Current Measurements
- Resistance Measurements
- Cabling for Measurements

13:15           **Wire and Connections**

- Wire Types
- Resistance and Current Capacities

**Wires and connections (continued)**

- Connectors and Splices
  - Selecting Terminals and Splices
  - Connectors for 12-Volt power
- Stripping and Crimping
- Useful Tools
- Classroom Projects
  - Battery Connector Cable
  - Current Measuring Cable
- Checking Connections

14:45      **Soldering and Desoldering**

- What is solder?
- Why solder?
- Soldering Irons, Tips, etc.
- Basic Soldering Techniques
- Tinning Wire Ends
- Splicing Wires
- Soldering Crimp Terminals
- Soldering Wires to Circular Connectors
- Checking Solder Joints
- Desoldering Techniques
- In-Class Soldering Project(s)
  - Multimeter-to-Method Cable
  - Pin Jack-to-Alligator Clip Cable

17:00      **DISMISSED****WEDNESDAY**

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08:00      **Basic Power Systems**

- Batteries
  - General Battery Information
  - Battery Charging Information
  - Testing a Battery
    - Using simple load testers (furnished to students)
    - Commercial load testers
- Solar Panels and Charge Regulators
- Gagehouse Wiring Suggestions

11:30      **LUNCH**12:30      **Troubleshooting Common Problems**

- Open Circuits
- Short Circuits
- Checking Current Drains

**Troubleshooting Common Problems (continued)**

- Manufacturer's Specs
- Checking Continuity
- Common Troubleshooting Techniques
- Troubleshooting "Rules"

**13:30 Grounding Principles and Circuit Protection**

- What is GROUND?
- Earth Grounds
- Power Grounds
- Analog Grounds
- Earth Grounding Systems
  - HIF Grounding Kits
  - HIF Cadweld Kits
- Equipment Protection Devices and Methods
- Lightning Information

**14:30 Outdoor Demonstrations**

- Demonstration of Cadweld system
- Use of Ground Resistance Meters

**15:30 Building and Testing an RF Antenna Cable****17:00 DISMISSED****THURSDAY**

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**08:00 The SDI-12 Interface Standard****08:45 Troubleshooting a DCP System**

- Sutron 8210 w/Sensors

**09:30 Troubleshooting SDI-12 Problems**

- Using the H-4191

**11:30 LUNCH****12:30 Troubleshooting a DCP System (continued)**

- Sutron 8210 w/Sensors

- 13:30            **Quick Overview of DCP/RF Troubleshooting**
- What is RF?
  - Summary of GOES Satellite System
  - General RF Troubleshooting
  - Using RF Wattmeters to isolate problems
  - Suggestions for RF Toolkit
- 16:00            **New Equipment Trends**
- 16:30            **Class Critiques**
- 16:40            **Open Discussion and Specific Questions**
- 16:50            **Box materials for shipping home**
- 17:00            **DISMISSED**

**Presenters**

Myron Brooks, Chief HIF, [mhbrooks@usgs.gov](mailto:mhbrooks@usgs.gov)  
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