

**Basic Electronics and Troubleshooting
Instrumentation**

Course Code: USGS-HIF-ID1081

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

Agenda

MONDAY

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

Tour of HIF Facilities

Basic Electronic Principles

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

Meters and Measurements

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

11:30 **LUNCH**

12:30 **Wire and Connections**

- Wire Types
- Resistance and Current Capacities
- Connectors and Splices
 - Selecting Terminals and Splices
 - Connectors for 12-Volt power
- Stripping and Crimping
- Useful Tools

Wires and connections (continued)

- Classroom Projects
 - Battery Connector Cable
 - Current Measuring Cable
- Checking Connections

Soldering and Desoldering

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

17:00 **DISMISSAL: dependent upon completion of tasks**

TUESDAY

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

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

Outdoor Demonstrations

- Demonstration of Cadweld system
- Use of Ground Resistance Meters

Building and Testing an RF Antenna Cable

17:00 **DISMISSAL: dependent upon completion of tasks**

WEDNESDAY

08:00 **The SDI-12 Interface Standard**

Troubleshooting a DCP System

- Data Collection Platform w/Sensors

11:30 **LUNCH**

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

- Data Collection Platform w/Sensors

Troubleshooting SDI-12 Problems

- Using the H-4191

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

17:00 **DISMISSAL: dependent upon completion of tasks**

THURSDAY

08:00 **HIF Repairs and Service**

HIF Instrument News

System Maintenance and Troubleshooting

- Hands-on applications in maintenance and troubleshooting of data collection platform systems

11:30 **LUNCH**

12:30 **System Maintenance and Troubleshooting (Continued)**

16:30 **Class Critiques**

16:40 **Open Discussion and Specific Questions**

16:50 **Box materials for shipping home**

17:00 **DISMISSAL: dependent upon completion of tasks**

Presenters

Myron Brooks, Chief HIF, mhbrooks@usgs.gov

Frank Henry, Chief Field Service Section, fshenry@usgs.gov

Joanne Jones, Publications Specialist, jjones@usgs.gov

Instructors

Keith Dardar, Electronics Technician, kmdardar@usgs.gov

Scott Kimball, Hydrologic Technician, skimball@usgs.gov

Gerald Kunkle, Electronics Engineer, gkunkle@usgs.gov

Richard Pardee, Electronics Technician, rwparddee@usgs.gov

Ed Parrozzo, Electronics Technician, parrozzo@usgs.gov

Course Coordinator: Richard Pardee: 228-688-2111; rwparddee@usgs.gov