Operating Instructions

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    Instruction Sheet 1043-540

Introduction

Qualified Persons

> ### ⚠ WARNING
>
> The equipment covered by this publication must be installed, operated, and maintained by qualified persons who are knowledgeable in the installation, operation, and maintenance of overhead electric power distribution equipment along with the associated hazards. A qualified person is one who is trained and competent in:
>
> - The skills and techniques necessary to distinguish exposed live parts from non-live parts of electrical equipment.
> - The skills and techniques necessary to determine the proper approach distances corresponding to the voltages to which the qualified person will be exposed.
> - The proper use of the special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools for working on or near exposed energized parts of electrical equipment.
>
> These instructions are intended only for such qualified persons. They are not intended to be a substitute for adequate training and experience in safety procedures for this type of equipment.

Read this Instruction Sheet

Thoroughly and carefully read this instruction sheet before programming, operating, or maintaining your S&C Universal Interface Module. Familiarize yourself with the safety information on page 3. The latest version of this instruction sheet is available online in PDF format at www.sandc.com. Select: Support/Product Literature Library.

Retain this Instruction Sheet

This instruction sheet is a permanent part of your S&C IntelliRupter. Designate a location where you can easily retrieve and refer to this publication.

Warranty

The standard warranty contained in S&C's standard conditions of sale, as set forth in Price Sheet 150, applies to the Universal Interface Module, except that the first paragraph of said warranty is replaced by the following:

(1) General: Seller warrants to immediate purchaser or end user for a period of 10 years from the date of shipment that the equipment delivered will be of the kind and quality specified in the contract description and will be free of defects of workmanship and material. Should any failure to conform to this warranty appear under proper and normal use within ten years after the date of shipment the seller agrees, upon prompt notification thereof and confirmation that the equipment has been stored, installed, operated, inspected, and maintained in accordance with recommendations of the seller and standard industry practice, to correct the nonconformity either by repairing any damaged or defective parts of the equipment or (at seller's option) by shipment of necessary replacement parts. The seller's warranty does not apply to any equipment that has been disassembled, repaired, or altered by anyone other than the seller. This limited warranty is granted only to the immediate purchaser or, if the equipment is purchased by a third party for installation in third-party equipment, the end user of the equipment. The seller's duty to perform under any warranty may be delayed, at the seller's sole option, until the seller has been paid in full for all goods purchased by the immediate purchaser. No such delay shall extend the warranty period.

Replacement parts provided by seller or repairs performed by seller under the warranty for the original equipment will be covered by the above special warranty provision for its duration. Replacement parts purchased separately will be covered by the above special warranty provision.

Warranty of the Universal Interface Module is contingent upon the installation, configuration, and use of the control or software in accordance with S&C's applicable instruction sheets. This warranty does not apply to major components not of S&C manufacture, such as batteries, and communication devices. However, S&C will assign to immediate purchaser or end user all manufacturer's warranties that apply to such major components.

Understanding Safety-Alert Messages

There are several types of safety-alert messages which may appear throughout this instruction sheet as well as on labels attached to the Universal Interface Module. Familiarize yourself with these types of messages and the importance of the various signal words, as explained below.

⚠ DANGER

"DANGER" identifies the most serious and immediate hazards which *will likely* result in serious personal injury or death if instructions, including recommended precautions, are not followed.

⚠ WARNING

"WARNING" identifies hazards or unsafe practices which *can* result in serious personal injury or death if instructions, including recommended precautions, are not followed.

⚠ CAUTION

"CAUTION" identifies hazards or unsafe practices which *can* result in minor personal injury or product or property damage if instructions, including recommended precautions, are not followed.

NOTICE

"NOTICE" identifies important procedures or requirements that *can* result in product or property damage if instructions are not followed.

Following Safety Instructions

If you do not understand any portion of this instruction sheet and need assistance, contact your nearest S&C Sales Office or S&C Authorized Distributor. Their telephone numbers are listed on S&C's website www.sandc.com. Or call S&C Headquarters at (773) 338-1000; in Canada, call S&C Electric Canada Ltd. at (416) 249-9171.

NOTICE

Read this instruction sheet thoroughly and carefully before installing or operating your S&C Universal Interface Module.

Replacement Instructions and Labels

If you need additional copies of this instruction sheet, contact your nearest S&C Sales Office, S&C Authorized Distributor, S&C Headquarters, or S&C Electric Canada Ltd.

It is important that any missing, damaged, or faded labels on the equipment be replaced immediately. Replacement labels are available by contacting your nearest S&C Sales Office, S&C Authorized Distributor, S&C Headquarters, or S&C Electric Canada Ltd.

Applicable Software

These instructions were prepared for use with software UIMD3C1X, Rev. 1.3.

You can find the revision number on the Setup disk label and on the main screen of the UIM, called the **PRESENT CONDITIONS** screen. For questions regarding the applicability of information in this chapter to future software releases, please contact S&C.

⚠ WARNING

These instructions do NOT replace the need for utility operation standards. Any conflict between the information in this document and utility practices should be reviewed by appropriate utility personnel and a decision made as to the correct procedures to follow.

Serious risk of personal injury or death may result from contact with electric distribution equipment when electrical isolation and grounding procedures are not followed. The equipment described in this document must be operated and maintained by qualified persons who are thoroughly trained and understand any hazards that may be involved. This document is written only for such qualified persons and is not a substitute for adequate training and experience in safety procedures for accessing high voltage equipment.

The Universal Interface Module and host control are connected to switchgear operating at primary voltage levels. High voltage may be present in the wiring to the switch control or the switch control itself during certain failures of the switchgear wiring or grounding system, or due to a failure of the switch itself. For this reason, access to the switch control should be treated with the same safety precautions that would be applied when accessing other high voltage lines and equipment. Follow all locally-approved safety procedures when working on or around this switch control.

Before attempting to access an existing switch installation, check carefully for visible or audible signs of electrical or physical malfunction (do this before touching or operating the switch control or any other part of the installation). These warning signs include such things as smoke, fire, open fuses, crackling noises, loud buzzing, etc. If a malfunction is suspected, treat all components of the installation, including the switch control and associated mounting hardware, as if they were elevated to primary (high) voltage.

Whenever you are manually reconfiguring the circuit (for example, during repairs), follow your company's operating procedures to disable automatic operation of the IntelliTEAM II system. This prevents any unexpected operation of a team member.

You can disable the IntelliTEAM II system by pressing the automatic operation **ENABLE/DISABLE** faceplate button to **DISABLE** on the faceplate of any active 5800 based team member of the team you want to disable, or turn on **PROHIBIT RESTORATION** on the faceplate of the UIM.

Interface Module Faceplate

This section describes various Universal Interface Module displays and controls. The following section, *Operational Overview*, explains how these components work with the external device to monitor the distribution feeder and manage switch operation.

The Interface Module controls are described below and shown in Figures 1 and 2.
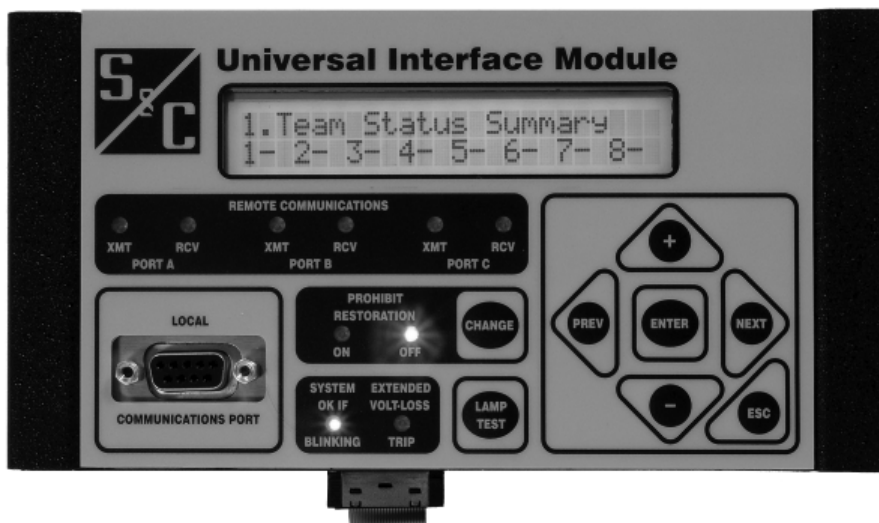
Figure 1. Panel-Mounted Universal Interface Module faceplate.
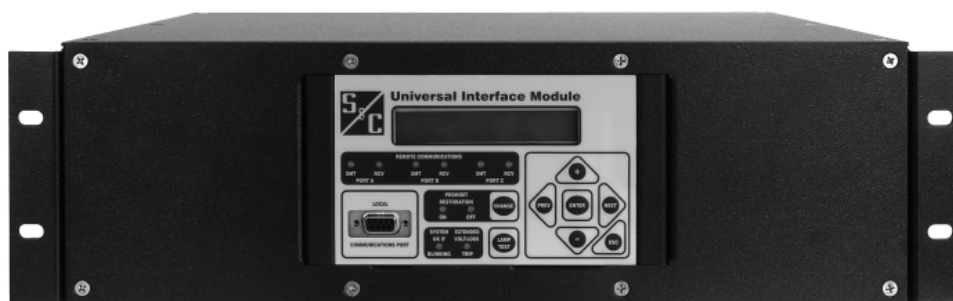
Figure 2. Rack-Mounted Universal Interface Module faceplate.

Local Communication Access Port - Allows you to connect your computer to the Interface Module, and use IntelliLINK® software to view data, change set points, download logged data, and update Interface Module software.

Power Input Terminals - The Panel-Mounted Interface Module requires 12 Vdc. The Rack-Mounted Interface Module can be ordered for a specific power requirement of: 12 Vdc, 24 Vdc, 48 Vdc, 125 Vdc, 120 Vac, or 240 Vac.

IED Communication Port - Connects to the external device and communicates using DNP 3.0 Protocol. The Universal Interface Module is configurable to utilize DNP points as they are mapped in the host device to satisfy the data requirements of IntelliTEAM II.

Two Radio Communication Ports - For connecting to a UtiliNet® Radio, and a fiber-optic transceiver, or other SCADA radio. The DNP points list is configurable.

Operation

Faceplate LEDs

The faceplate includes the following LEDs:

Prohibit Restoration LED Indicators

These LEDs indicate when Prohibit Restoration is active.

Extended Volt-Loss Trip LED

This LED is ON when a trip has occurred due to the extended voltage loss logic of the UIM.

System OK If Blinking LED

This LED blinks once per second when Universal Interface Module software is running normally.

Remote Communication RCV/XMT LEDs

These LEDs blink when the Universal Interface Module sends or receives signals through its communication equipment. There is LED indication for Ports A, B, and C.

> **RCV LED** - Blinks when the Interface Module detects an incoming character.

> **XMT LED** - Blinks when the Interface Module sends one or more characters.

NOTE: You will see activity on both these LEDs only if remote-communications equipment is installed, properly connected, and receiving power. The **XMT LED** blinks any time a transmit is attempted, whether or not communication equipment is properly installed.

Faceplate Switches

The faceplate includes the following switches:

Change the State of Prohibit Restoration

Press the CHANGE button to enable or disable Prohibit Restoration.

IMPORTANT: When you **Prohibit Restoration**, you disable IntelliTEAM II operation in all teams that this control is a member of.

Lamp Test switch

Press this switch to illuminate all LEDs, to test that they operate.

LCD Display Navigation switches

Use this switch group to scroll each LCD field into view, and enter commands from the faceplate. The **ESC** button returns the LCD field to the main screen, which is *Team Status Info*.

Faceplate LCD

The faceplate LCD allows you to quickly access key information while you are at the site. The LCD displays five categories of information. The top line of the display always begins with the category number.

1. Team Status Info - Includes the team ID and ready/fault/alarm status for each team where this control is a member. "**R**" indicates that the team is ready to take action (even if a transfer event has already taken place) and that there are no errors, faults, or team communication problems present. "**F**" indicates that this team is isolating a faulted line segment. "**A**" indicates that an Alarm is active. An active switch error, and the Prohibit Restoration status are also indicated. Real-Time Load and Capacity are displayed for each team. (Team Status information is also reported on the *TEAM OPERATION* screen.)

2. Changeable Parameters

3. External Device Information

4. Communications Information

5. Miscellaneous Information - The software version, firmware identification, and physical location of the control are indicated. (These values are also reported on the PRESENT CONDITIONS screen.)

Category	Field	Description
1. Teams	1. Team Status Summary (indicated for each team by team number)	R = Ready A = Alarm F = Faulted – = Team not configured
	1. Team Sw. Errors:	If PRESENT, press **ENTER** to clear
	1. Team Prohibit Restore	ON or OFF, use CHANGE Prohibit Restoration button, on faceplate, to change status
	1. Team 1 <Name>	Load and Capacity (AMPS x 1.0)
	1. Team 2 <Name>	
	1. Team 3 <Name>	
	1. Team 4 <Name>	(NOTE: the Team "<Name>" is entered on the *Team Setup* screen.)
	1. Team 5 <Name>	
	1. Team 6 <Name>	
	1. Team 7 <Name>	
	1. Team 8 <Name>	
2. Changeable Parameters	2. Compact Flash	ON or OFF, press **ENTER** to change (Turn Off before removing CF Card.)
	2. Volt Loss Sectionalize	ON or OFF, press **ENTER** to change
3. External Device	3. Switch Status	CLOSED, OPEN, BAD, or ERROR
	3. Supervisory Mode	LOCAL, REMOTE, or N/A
	3. Trouble Status	NORMAL, PRESENT, or N/A
	3. Fault Status	NORMAL or DETECT
	3. Voltage Status	NORMAL or ACTIVE
	3. Freq. Trip Status	NORMAL, ACTIVE, or N/A
	3. Active Profile	NORMAL, ALTERNATE, or N/A
	3. Hot Line Tag	NORMAL, ACTIVE, or N/A
	3. Ground Trip	UNBLOCKED, BLOCKED, or N/A
	3. Reclosing	UNBLOCKED, BLOCKED, or N/A

Table 1. LCD Data Page for Universal Interface Module (continued on page 8).

Category	Field	Description
4. Communications	4. Local Address	DNP/RTU Network Address
	4. Master Address	Master Station RTU Address
	4. Master Port	DNP frames destined for the Master Station are sent to this port: A, B, C, D, or N/A. (D is the port on the faceplate)
	4. Master IP Address	IP Address used to route DNP frames to Master Station over a UDP connection
	4. Maint. Master	Secondary Master Address that will not receive unsolicited messages
	4. Unsolicited:ENABLED or DISABLED	From SETUP: Communications-General screen
	4. Port A \Baud + Protocol: DNP or ICP	From SETUP: Communications-Serial Ports screen
	4. Port B \Baud + Protocol: DNP or ICP	From SETUP: Communications-Serial Ports screen
	4. Port C \Baud + Protocol: DNP or ICP	From SETUP: Communications-Serial Ports screen
	4. Port D \Baud + Protocol: DNP or ICP	From SETUP: Communications-Serial Ports screen
	4. Native IP: XXX.XXX.XXX.XXX	
	4. Add-on IP: XXX.XXX.XXX.XXX	
5. Miscellaneous	5. Ver: XXX.XXX.XXX.XXX Product: XXXXXXXX	Software version number Software product identification
	5. Location Info 1: XXXXXXXXXXXXXXXX	48-letter physical location of control, entered on External Device Setup screen
	5. Location Info 2: XXXXXXXXXXXXXXX	Continuation of screen above
	5. App. Code Info: XXXX.XXXX.XXXX.XXXX	Used by S&C to track exact identity and ensure application integrity
	5. EOS Info: XXX.XXX.XXX.XXX	Operating system version installed in the control

Table 1. LCD Data Page for Universal Interface Modules (continued from page 7).

Interface Module Software

The Interface Module software is preloaded in the factory. This software manages the minute-by-minute functioning of the team member. It continually monitors:

- voltage and current on the feeder
- incoming SCADA commands
- the faceplate switch settings
- the internal clock/calendar
- the software setpoint values
- various other setpoints and data values as needed

Based on this information, the Interface Module software decides how to make a team response to a possible overcurrent fault, a change in voltage, a command from the faceplate or SCADA master station, and other conditions.

The software, setpoint values, and historical data are all stored in non-volatile Interface Module memory. This memory survives power interruptions, and the memory chip has a minimum 10 year shelf life (without power).

IntelliLINK Software

The IntelliLINK software is supplied on the Setup disk and runs on IBM/PC-compatible computers. This software allows you to communicate with the Interface Module software while you are at the site. Using the IntelliLINK software, you can:

- Enter installation-dependent operating parameters (set points), such as a network address, automatic operation features, etc.
- Monitor real-time data, such as the present line voltage and current supplied from the host control device.
- Examine team operation history.
- Transfer all configuration, operating, and historical data from the Interface Module to a "report" file on your computer.
- Download new Control software into the Interface Module.
- Troubleshoot assorted types of Interface Module installation problems.

SCADA Communications Equipment

S&C IntelliTEAM II products include DNP 3.0 protocol for team communication. If you have a SCADA system that uses DNP, you can remotely monitor, control, and change setpoints for the Universal Interface Module and external device.

The communication hardware (radio, fiber-optic transceiver, etc.) is connected directly to the Universal Interface Module. The external device communicates with the Interface Module and to the SCADA System through the Interface Module communication device.

For more details, see the *DNP Points List and Implementation*, and the manufacturer's documentation for the communication equipment, or contact S&C.

Operational Overview

This section explains how the Interface Module and host control device work together to detect and respond to overcurrent fault events and voltage outages.

When a circuit event occurs the response taken by automated equipment in an IntelliTEAM II system can be broken down into two categories. One is the isolation of the normal source from the faulted circuit section. The other is further isolation of the faulted section and subsequent restoration of unfaulted circuit sections. The IntelliTEAM II Automatic Restoration System provides the latter functionality, but only after the successful isolation of the normal source by breaker, recloser, or sectionalizing means.

Therefore, the IntelliTEAM II Interface Module does not interfere with the normal fault isolation functionality of its host breaker/recloser device. The Interface Module only monitors the host device for changes in status so that it can begin to take action should the breaker/recloser indicate that it has interrupted a fault and locked out. This monitoring of the host breaker/recloser is performed over a DNP communications link at a pre-configured polling interval (normally one second). The data received from the host device includes switch status, lockout status, overcurrent status, voltage status, error status, and others, in order for IntelliTEAM II to have adequate information to perform its function.

Once the host breaker/recloser device has tripped open and is in the lockout state, or a source side device has tripped open and locked out, the Interface Module may then take control of the host device. If the host device is not yet open due to the circuit event (i.e. a source side fault has occurred), but IntelliTEAM II has determined that the source device for this team is open and locked out, the Interface Module can command the host breaker/recloser to open so that the reconfiguration process can continue. This is the only case in which the Interface Module will open the host device for the purpose of isolation.

Then, by acting as a typical team member, the Interface Module may close the host breaker/recloser device at the appropriate time during the course of the IntelliTEAM II reconfiguration process. In doing so the Interface Module and IntelliTEAM II may utilize some features of the host breaker/recloser device if allowed to by the configuration., For example, when closing the host breaker/recloser into a dead section of the circuit the Interface Module may disable the Reclosing feature of the breaker/recloser. If the breaker/recloser remains in the closed position for the configured time period, indicating that the reenergized circuit section is unfaulted, the Interface Module will then re-enable the reclosing feature.

Automatic Load Transfer

The IntelliTEAM II system defines a team as two or more switch controls that protect a given line segment by transferring load to an alternate source. A switch control may be a member of one or more teams.

After the host control device completes its sectionalizing and/or phase loss logic, the Interface Module can reclose its line switch to transfer load to an adjacent distribution circuit, or to restore service to load on the source side of the fault. To do this, the Interface Module uses information it receives from other team members.

The team members share information through a "coach," which includes a coach ID number and an incrementing visit counter. Normally, the coach moves among team members, visiting each one within a prescribed period of time. If it arrives at a team member that has already received that ID and visit counter (the counter must be greater than the last if the ID is the same), the coach assumes it is a duplicate and ends.

If a team member does not hear from the coach within a prescribed period, that team member can generate a new coach. The new coach will have an ID number one higher than the last coach that visited, as well as a new visit counter. The new coach must determine the state of the team and line segment, and begin to take action if necessary. If a coach arrives to find that another coach with a higher ID has visited, the lower ID coach ends.

When an event begins, any team member that has witnessed the event may call out to the coach and the other members within that team. This call includes a sequence number, the nature of the event, and which team member made the call. Each team member continually monitors for these calls.

- If the call is to restore service to the local team, the coach must first visit the other normally closed team members to verify that they are open. It will then move in a prioritized order to team members that may be able to provide an alternate source. This includes using the alternate source sequence list, if configured.
- If the call is to allow service to be restored to an adjacent team, the coach immediately moves to the calling team member.

As soon as the event began, the loading averaging stopped so that the load prior to the event would be used during the reconfiguration process.

Loading Restrictions

As a default, the team decides whether or not to restore a line segment based only on the available capacity of the feeder (updated as the reconfiguration progresses) and any restrictions placed on a line segment due to wire size or other limiting factors.

This method does not prevent the overloading of a circuit when disjoint line segments (such as on a bifurcated circuit) assume the loading information is correct, and both close to restore independent loads at the same time (or nearly the same time).

If a line segment cannot handle any overloading at all, you can set the "Contract Required" (on the *SETUP: Team* screen) to "Yes" for any team. Once team members encounter a line segment in a restoration path that requires a contract, they will communicate with all subsequent line segments in the direction of the alternate source to insure that the alternate source will not be overloaded. (Note that this also slows down the reconfiguration process.) For more details, see "Member Tasks" on page 12.

You can also restrict the number of line segments that a team can pick up using the "Line Segment Limit" (on the *SETUP: Team* screen). For example, "Add 1" inhibits any other line segments from being restored through a member after it restores its first line segment. When the value is set to "N/A," the team can pick up as many line segments as capacity allows. The line segment limit may be configured in any or all teams, but it is a global value for all members in that team. The limit is continuously propagated outward from the source segment as the coach travels from team member to team member. As the limit propagates outward, limits with a lower configured count take precedence and are then propagated further.

If you set a line segment limit, the team automatically sets the "Contracts Required" setpoint to "Yes."

When the coach arrives at the team member for the switch that it would like to close, it looks for the coach from the adjacent team. If it is not already there, the first coach puts out a call, and the second coach moves to that team member. With both coaches there, they can make a decision whether or not to close the switch (based on available capacity, contracts for resources, and any other restrictions). As switches close, the IntelliTEAM II system updates the available capacity on feeders that were used to restore service. When a transfer with a known load value occurs, it resets the loading data to reflect the new value. (This updates the information more quickly than the "2-minute" load averaging.)

As load is restored, some team members may think they should begin the Return to Normal process for their team(s). However, Return to Normal is not allowed to begin based on the "two-coach rule": a coach that knows its team is not being fed from its normal source will not allow a coach from an adjacent team to start the Return to Normal process.

If a team is in a reconfigured state and the alternate source has a new event, the team can once again look for a new alternate source, if available, to keep its line segment energized.

IMPORTANT: A normally open switch in a source/substation location must have the voltage sensors on the substation side. Otherwise, transfer operations will not work correctly. (If this is an existing installation, with voltage sensors on the wrong side that cannot be moved to the correct side, contact S&C for more information.)

To enable automatic load transfer:

1. Set the "Team Logic" setpoint on the *SETUP: Team* screen to "Enabled" (for each team, if applicable). See the *Setup Instructions* for more details.
2. Use either the faceplate **PROHIBIT RESTORATION - OFF** command or a SCADA command to enable automatic operation of the switch control.

Contracts

Within an IntelliTEAM II system, reconfigurations may occur simultaneously at more than one location. To prevent overloading circuits, the system uses contracts to insure that it does not pick up more line segments than the circuit can handle. Contracts travel across teams to secure resources that are needed to energize a line segment.

As the IntelliTEAM II system transfers load to an alternate source, a contract is required if the "Line Segment Limit" has been set or if a valid line segment limit has been propagated from the source. A contract is generally not required unless the team being energized is being fed from an alternate source, either directly or indirectly. For example, a source/substation switch never requires a contract to close, but a tie switch always requires a contract to close.

Every team member has a contract agent. Unlike a coach, the contract agents are static; only the contract is passed in communications. The contract agent is responsible for obtaining contracts and maintaining contracts that are outstanding.

When a contract is required:

A. The coach on the requesting line segment of the transfer event asks the team member to close an alternate source switch to energize the segment.

B. The team member summons the coach on the "alternate-source" line segment to coordinate and verify circuit resources.

C. If the team member finds that the line segment limit has not yet been met, it issues a request to the local contract agent. While the contract agent attempts to obtain a

contract, both the requesting coach and the "alternate-source" coach must remain at this team member (except to satisfy the visit timer). The team member also waits while the contract is being obtained.

D. The contract agent assembles the necessary information into a contract record and sends the record to the agent at the present source of the "alternate-source" line segment. This requesting agent then monitors the return of the record and its status.

E. The contract agent receiving the new contract request verifies that the circuit resources are available from its local perspective. If resources are not available, the agent declines the contract and returns it to its origin. If the contract is allowed based on local data, the contract agent adds its ID to the routing list, and forwards the contract to the next team member in the direction of the absolute source.

F. Once the contract request reaches the agent at the source/substation switch, the agent checks if adequate circuit resources are available to accept the contract. If not, it declines the contract and returns it to its origin. If circuit resources are available, the contract agent accepts the contract, assigns itself as the granting contract agent ID, and sends the contract back toward the origin, keeping a copy of the contract locally. It also increments its local count of line segments that have been transferred.

G. Using the contract routing table, the contract returns to the next contract agent going back up the list. If the contract was declined, it simply forwards the contract toward the point of origin. If the contract was accepted, it stores a copy of the contract in its local contract list, then forwards the contract toward the point of origin. It also increments its local count of line segments that have been transferred. This process continues until the contract reaches the requesting agent.

H. If the contract was declined, the requesting agent reports back to the team member that the transfer is not allowed, then dissolves the contract. If the contract was accepted, the agent reports back to the team member that the transfer may continue as normal. The agent then stores the contract locally.

Once a contract is accepted, it must be maintained. (Normally, the requesting agent initiates contract maintenance, though an intermediate contract agent can also do so.) Each contract has an associated maintenance timer. If the timer expires, the agent sends a maintenance message along the contract route to verify the existence of the contract and reset the maintenance timer.

The requesting contract agent also watches for any reason to dissolve the contract directly. Some examples include a manual switching operation that moves the line segment to another source, a local Return to Normal operation, or a second contingency event that causes additional reconfiguration of the circuit. If the contract must be dissolved, the requesting agent sends a message along the contract route. At each location, the contract is dissolved and the local line segment count is decremented.

Prohibit Restoration

This screen displays the present status of the Prohibit Restoration feature, and allows you to change the status. The intent of the Prohibit Restoration feature is to prevent one or more teams from restoring service to their associated line segments, while not directly affecting the ability for any switch to automatically sectionalize. This feature may be enabled manually (through SCADA, this screen, or the front panel button), when restoration is undesirable (such as when load shedding is required), or enabled automatically through the use of the Prohibit Restoration Timer on the *SETUP: Team* screens.

Automatically enabling this feature through the timer is useful when you would like a predetermined timeframe in which a team can perform restoration. If the restoration has not taken place within this time then all restoration activity is halted. The team remains in an alarm state until you clear the Prohibit Restoration feature.

To change the status of Prohibit Restoration from this screen you must click on either the "Disable Prohibit Restoration" text button or the "Enable Prohibit Restoration" text button. A dialog box will then be displayed so that you can either verify your choice, or cancel the action.

NOTE: If Prohibit Restoration is active, view the *DATA LOGGING STATUS POINTS* screens to determine if this was a result of a SCADA command or the Prohibit Restoration Timer.

Figure 3. Prohibit Restoration Screen.

Saving a Setup Configuration

If two or more team members use a similar setup configuration and the same software version, you can save the configuration from one team member and load it into the other(s). Then you only need to manually adjust the setpoints that are different for each team member.

You can also use this process to save the setpoint values on the SETUP: Team screen. You can then load these setpoints into each team member to insure that the SETUP: Team screen is identical for all team members.

NOTICE

Software UIMD3C1X Revision 1.3 will not accept setpoints from earlier versions. After upgrading to Revision 1.03, save a new setpoint configuration file.

Save a Setup Configuration

1. *Determine which team member contains the configuration you want to save.*

2. *Connect your computer to the selected team member and start IntelliLINK software.*

    For details, see *Start IntelliLINK* in *Instruction Sheet 1043-530*.

3. *Select File > Save Setpoints.*

4. *In the Select Setpoint Groups to Save dialog box (see Figure 4), choose the setpoint values you want to save.*

    To save setpoint values for a specific team, click the **iteam00X** box for the desired team number (X).

    To save all setpoint values (including values for teams that may not have been configured), click the **Select all** button.
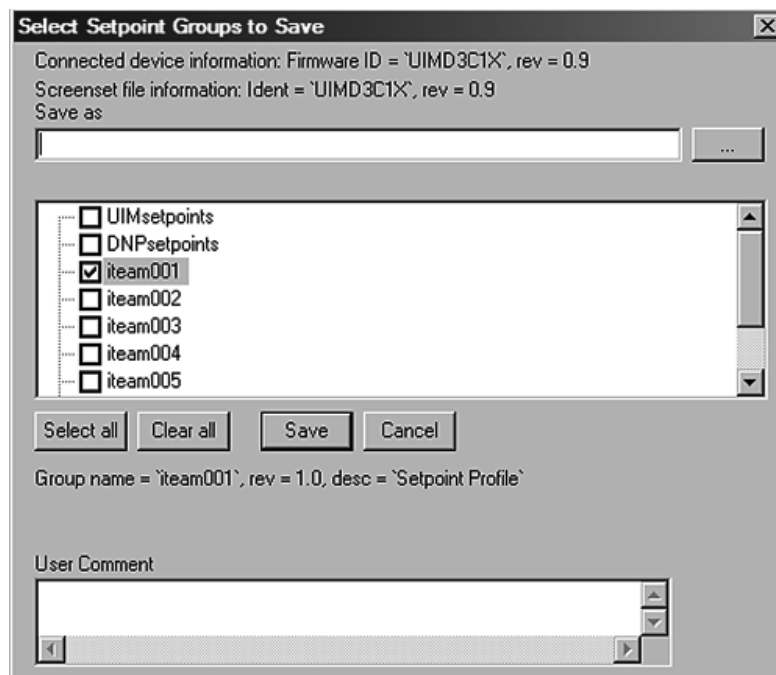

Figure 4. Select Setpoint Groups to Save Screen.

5. **In the Select Setpoint Groups to Save dialog box, specify a name and location for this configuration .XDT file (use the "..." button for more file and folder information), then click Save, and click OK.**

   Be sure to name team setpoint profiles logically (for example, Team2 for Team 2's setpoints). When you load the setpoint profile into another team member, the IntelliLINK software will automatically place the profile into the *SETUP: Team* screen with the matching team number.

   If you do not specify a location, the file is saved to the same directory as the program files for this for this team member (for example, the default location for SNCD-B1X report files is `C:\ELine\SNCD-B1X\`). The extension ".XDT" is added automatically.

Loading a Setup Configuration

Load a Saved Configuration into a Team Member

1. **Connect your computer to the team member where you want to load the saved configuration, then start IntelliLINK software.**

   For details, see *Start IntelliLINK* in *Instruction Sheet 1043-530*.

2. **From the File menu, choose Load Setpoints.**

3. **In the dialog box, select the .XDT file for the configuration you want to load, then click Open.**

4. **Make any setpoint changes that are required for this team member.**

   For details, see the Setup chapter.

NOTICE
Be sure that correct values for the External Device Menu > Misc Setup "Physical Location" (on the *SETUP: Miscellaneous* screen) and the External Device Menu "Control Device RTU Address" (on the *SETUP: Communications* screen) are entered.

IntelliLINK Software Without a Connection

To view the IntelliLINK screens and Help file without connecting to a team member or a snapshot:

1. *Start the IntelliLINK software on your computer.*

2. *During startup, click Cancel to close the Connect dialog box.*

3. *From the File menu, choose Open Screenset.*

4. *In the Open Screenset dialog box, find and select the WMN file whose name matches the version name on the Setup software disk for the Interface Module, and open that file.*

Using Snapshots

You can save operational and data logging information in "snapshots" (.VM, virtual memory files). These snapshots let you view data, generate a report, and save or change setpoint configurations even when you are not connected to a switch control. To access the stored information, you "connect" to the snapshot instead of the physical control. Each switch control Setup disk includes a sample snapshot.

Save Settings and Data to a Snapshot

1. *Connect your computer to the Interface Module from which you want save information, then start the IntelliLINK software.*

   For details, see *To Start the IntelliLINK Software* in *Instruction Sheet 1042-531*. If your computer is already connected to the team member, you can skip this step.

2. *From the File menu, choose Save Snapshot.*

3. *In the dialog box, specify a file name and location for this snapshot, then click Save.*

   If you do not specify a location, the file is saved to the same directory as the program files for this for this team member (for example, the default location for SNCD-B1X report files is C:\ELine\SNCD-B1X\). The extension ".VM" is added automatically.

View (connect to) a Snapshot

1. *Start the IntelliLINK software on your computer. During startup, click Cancel to close the Connect dialog box.*

   If the IntelliLINK software is already running, choose Connection > Disconnect. If you want to view a snapshot for a different type of control, then choose Close Screenset from the File menu, to clear the present screenset from memory.

2. *From the File menu, choose Open Snapshot.*

   The Open Controller Data File dialog box opens. Select the snapshot that you want to view, then click Open.

3. *If you plan to change the configuration settings in the snapshot, click Yes at the Connect to File dialog box. If you want to avoid accidentally changing a setting, click No.*

   The IntelliLINK software opens and displays the contents of the selected snapshot.

Save Changes You Make in the Snapshot

All changes you make to configuration settings in the snapshot are automatically saved to disk immediately. You do not need to "save" the changes in a separate operation.

Updating Software

Occasionally, you may need to update the software that is stored in the Interface Module (the Control software). The Update program, installed with the IntelliLINK software, lets you easily replace the old Control software with the newer version.

IMPORTANT: The setpoint values and historical data stored in the Interface Module could be lost during the update process. To be safe, always generate all needed reports, using the old IntelliLINK and Control software, before you update the Control software.

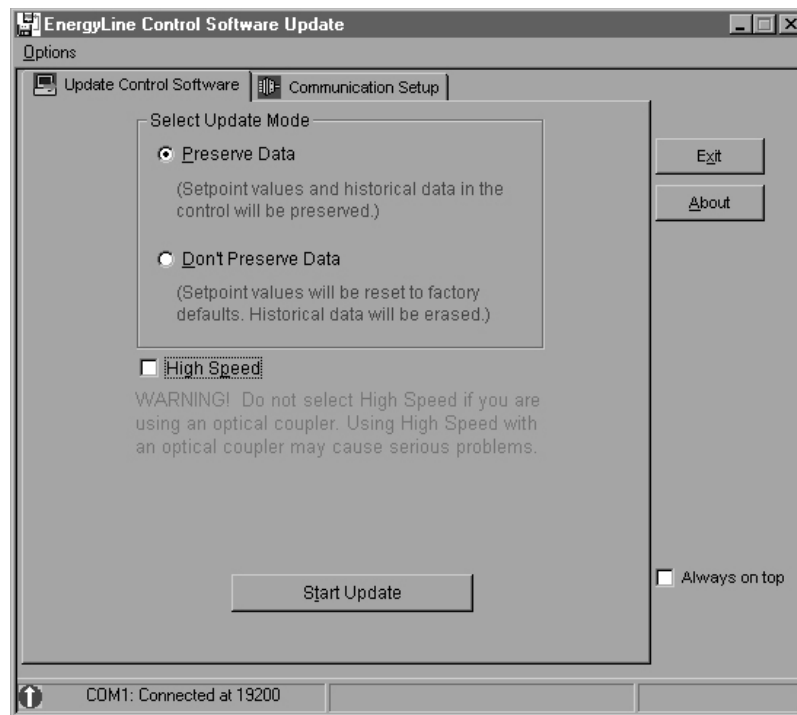1. ***Install the contents of the new Setup disk on your computer.***

   For details, see *To Start the IntelliLINK Software* in *Instruction Sheet 1042-531*.

2. ***Connect your computer to the Local Access port on the Interface Module.***

3. ***Start the Update program.***

   A. In Windows, choose Start menu > Programs > EnergyLine > Update.

      The Update window appears (Figure 5).

Figure 5. Control Software Update Window

   B. Select the desired options, then click Start Update.

   NOTE: If your Interface Module is not connected to COM1 on your computer, click on the Communication Setup tab, select the correct comm port, click Connect, and then return to the Update Control Software tab and click Start Update.

   The update process may take up to 15 minutes. You can follow the progress in the lower right corner of the window. Once the update is complete, the window automatically closes.

⚠ **CAUTION**
If you cancel the update process after it has started, that will deactivate the software in the control and make it impossible to restore any data. **Do not** use the "Preserve Data" option when you restart the update process. Since the data have now been lost, all setpoints must be reconfigured manually.

NOTICE
If the software on the disk is not the same type as the software in the Interface Module, an error message appears. Note which software version is in the Interface Module, then press <Enter> to abort the update process. When you have the correct new software version, repeat the steps above.

DNP Implementation

DNP Implementation

This implementation of DNP and this section of documentation conform to the document DNP V3.00 Subset Definitions, Version 2.00, available from the DNP Users Group.

Device Profile Description

This section describes the compatibility of S&C's implementation of DNP with other devices.

```
DNP V3.00
DEVICE PROFILE DOCUMENT
```

Vendor Name: S&C Electric Company	
Device Name: S&C Universal Interface Module	

Highest DNP Level Supported:
    For Requests - Level 2
    For Responses - Level 2
	Device Function:
	    ___ Master X Slave

Notable objects, functions, and/or qualifiers supported in addition to the Highest DNP Levels Supported (the complete list is described in the attached table):
 	
    8-Bit Unsigned Integers_____
    _____
    _____
    _____
    _____	

Maximum Data Link Frame Size (bytes)
    Transmitted - 292
    Received   - 292
	Max Application Fragment Size (bytes)
	    Transmitted - 2048
	    Received - 2048

Maximum Data link Re-tries:
    X None
    __ Fixed at _____
    __ Configurable, range 1 to 25
	Maximum Application Layer Re-tries:
	    __ None
	    __ Fixed at _____
	    X Configurable, range 0 to 10

```
Requires Data Link Layer Confirmation:
   X  Never
   __ Always
   __ Sometimes      If 'Sometimes', when?
   __ Configurable   If 'Configurable', how?
```

```
Requires Application Layer Confirmation:
   __ Never
   __ Always (not recommended)
   X  When reporting Event Data (Slave devices only)
   __ When sending multi-fragment responses (Slave devices only)
   __ Sometimes      If 'Sometimes', when?
   __ Configurable   If 'Configurable', how?
```

```
Timeouts while waiting for:
   Data Link Confirm       X None  __ Fixed  __ Variable  __ Config
   Complete Appl. Fragment __ None  X  Fixed  __ Variable  __ Config
   Application Confirm      __ None  __ Fixed  __ Variable  X  Config
   Complete Appl. Response X None  __ Fixed  __ Variable  __ Config
   Others _____
   Attach explanation if 'Variable' or 'Configurable' was checked
   (see Note 1 below for explanation)
```

```
Sends/Executes Control Operations:
   WRITE Binary Outputs    X  Never  __ Always  __ Sometimes  __ Config
   SELECT/OPERATE          __ Never  __ Always  X  Sometimes  __ Config
   DIRECT OPERATE          __ Never  __ Always  X  Sometimes  __ Config
   DIRECT OPERATE - NO ACK __ Never  __ Always  X  Sometimes  __ Config

   Count > 1               X  Never  __ Always  __ Sometimes  __ Config
   Pulse On                __ Never  __ Always  X  Sometimes  __ Config
   Pulse Off               __ Never  __ Always  X  Sometimes  __ Config
   Latch On                __ Never  __ Always  X  Sometimes  __ Config
   Latch Off               __ Never  __ Always  X  Sometimes  __ Config

   Queue                   X  Never  __ Always  __ Sometimes  __ Config
   Clear Queue             X  Never  __ Always  __ Sometimes  __ Config

   Attach explanation if 'Sometimes' or 'Configurable' was checked
   (see Note 2 below for explanation)
```

FILL OUT THE FOLLOWING ITEM FOR MASTER DEVICES ONLY:	
Master Expects Binary Input Change Events: __ Either time-tagged or non-time-tagged for a single event __ Both time-tagged and non-time-tagged for a single event __ Configurable (attach explanation)	
FILL OUT THE FOLLOWING ITEMS FOR SLAVE DEVICES ONLY:	
Reports Binary Input Change Events when no specific variation requested: __ Never X Only time-tagged __ Only non-time-tagged __ Configurable to send both	**Reports time-tagged Binary Input Change Events when no specific variation requested:** __ Never X Binary Input Change with Time __ Bin In Change Relative Time __ Configurable (explain)
Sends Unsolicited Responses: __ Never X Configurable (explain) __ Only certain objects __ Sometimes (explain) __ ENABLE/DISABLE UNSOLICITED Function codes supported (see Note 3 below)	**Sends Static Data in Unsolicited Responses:** __ Never __ When Device Restarts X When Status Flags Change No other options are permitted. (see Note 3 below)
Default Counter Object/Variation: __ No Counters Reported __ Configurable (explain) X Default Object - 20 Default Variation - 5 __ Point-by-point list attached	**Counters Roll Over at:** __ No Counters Reported __ Configurable (explain) __ 16 Bits X 32 Bits __ Other Value _____ __ Point-by-point list attached
Sends Multi-Fragment Responses (Slave Only): X Yes __ No	

NOTE 1: Timeouts While Waiting for Confirmations

When an application layer response confirmation is requested, the Interface Module waits before sending another response/confirmation attempt (if the retry number has not been reached), or stopping the confirmation process.

You can set the "Time Delay Between Retries" with the Setup software or via SCADA. (See the Setup chapter for more details.)

NOTE 2: Control Operations Executed

For all Binary Output Relay operations and Analog Output operations, the allowed control functions are:

- `Select/Operate`
- `Direct Operate`
- `Direct Operate No Ack`

The master station can choose which of these three functions to use at any given time.

The Switch Control ignores the On Time and Off Time values and the Queue and Clear flags in the Control Code.

For more details, see the Control Relay Output Block section of the document object library in the DNP V3.00 Basic 4 Document Set, available from the DNP Users Group.

NOTE 3: Unsolicited Responses

The Switch Control returns unsolicited responses to the configured master station address when a change occurs in any mapped status point that is configured for event reporting, when the configured deadband is exceeded in any mapped analog input point that is configured for event reporting, or when the configured deadband is exceeded for any mapped counter point that is configured for event reporting.

You can control the delivery of unsolicited response messages by adjusting the "Unsolicited Transmit Delay Event Count" and the "Unsolicited Transmit Delay Time" in the Setup software.

You can enable and disable unsolicited responses from the Setup software or via SCADA (function code 20 to enable, function code 21 to disable).

DNP Implementation

Implementation Table

This section describes which objects and requests this implementation accepts and which responses are returned. Object, Variation, and Qualifier Codes in the request must exactly match what is expected. All application layer responses use the standard response function code 129. Unsolicited responses, if configured, will always use function code 130. Included in the table is the default variation returned if no specific variation is requested. This also applies to Class data and unsolicited reports where applicable.

OBJECT			REQUEST		RESPONSE
Obj	Var	Description	Func Code (dec)	Qualifier Codes (hex)	Default Var. (hex)
1	0	Binary Input - All Variations	1	06	01
1	1	Binary Input	1	06	
1	2	Binary Input with Status	1	06	
2	0	Binary Input Change - All Variations	1	06,07,08	02
2	1	Binary Input Change without Time	1	06,07,08	
2	2	Binary Input Change with Time	1	06,07,08	
2	3	Binary Input Change with Relative Time (object parsed but no data to return)	1	06,07,08	
10	0	Binary Output - All Variations	1	06	02
10	1	Binary Output (object parsed but WRITE not used)			
10	2	Binary Output Status (only the on-line bit is used)	1	06	
12	0	Control Block - All Variations			
12	1	Control Relay Output Block	3,4, 5,6	17,28	echo of request
12	2	Pattern Control Block			
12	3	Pattern Mask			

OBJECT			REQUEST		RESPONSE
Obj	Var	Description	Func Code (dec)	Qualifier Codes (hex)	Default Var. (hex)
20	0	Binary Counter - All Variations	1,7,8 9,10	06	05
20	1	32-Bit Binary Counter	1	06	
20	2	16-Bit Binary Counter	1	06	
20	3	32-Bit Delta Counter			
20	4	16-Bit Delta Counter			
20	5	32-Bit Binary Counter without Flag	1	06	
20	6	16-Bit Binary Counter without Flag	1	06	
20	7	32-Bit Delta Counter without Flag			
20	8	16-Bit Delta Counter without Flag			
21	0	Frozen Counter - All Variations	1	06	09
21	1	32-Bit Frozen Counter	1	06	
21	2	16-Bit Frozen Counter	1	06	
21	3	32-Bit Frozen Delta Counter			
21	4	16-Bit Frozen Delta Counter			
21	5	32-Bit Frozen Counter with Time of Freeze			
21	6	16-Bit Frozen Counter with Time of Freeze			
21	7	32-Bit Frozen Delta Counter with Time of Freeze			
21	8	16-Bit Frozen Delta Counter with Time of Freeze			
21	9	32-Bit Frozen Counter without Flag	1	06	
21	10	16-Bit Frozen Counter without Flag	1	06	
21	11	32-Bit Frozen Delta Counter without Flag			
21	12	16-Bit Frozen Delta Counter without Flag			

OBJECT			REQUEST		RESPONSE
Obj	Var	Description	Func Code (dec)	Qualifier Codes (hex)	Default Var. (hex)
22	0	Counter Change Event - All Variations	1	06,07,08	05
22	1	32-Bit Counter Change Event without Time	1	06,07,08	
22	2	16-Bit Counter Change Event without Time	1	06,07,08	
22	3	32-Bit Delta Counter Change Event w/o Time			
22	4	16-Bit Delta Counter Change Event w/o Time			
22	5	32-Bit Counter Change Event with Time	1	06,07,08	
22	6	16-Bit Counter Change Event with Time	1	06,07,08	
22	7	32-Bit Delta Counter Change Event w/ Time			
22	8	16-Bit Delta Counter Change Event w/ Time			
23	0	Frozen Counter Event - All Variations			
23	1	32-Bit Frozen Counter Event without Time			
23	2	16-Bit Frozen Counter Event without Time			
23	3	32-Bit Frozen Delta Counter Event w/o Time			
23	4	16-Bit Frozen Delta Counter Event w/o Time			
23	5	32-Bit Frozen Counter Event with Time			
23	6	16-Bit Frozen Counter Event with Time			
23	7	32-Bit Frozen Delta Counter Event w/ Time			
23	8	16-Bit Frozen Delta Counter Event w/ Time			
30	0	Analog Input - All Variations	1	06	04
30	1	32-Bit Analog Input	1	06	
30	2	16-Bit Analog Input	1	06	
30	3	32-Bit Analog Input without Flag	1	06	

OBJECT			REQUEST		RESPONSE
Obj	Var	Description	Func Code (dec)	Qualifier Codes (hex)	Default Var. (hex)
30	4	16-Bit Analog Input without Flag	1	06	
31	0	Frozen Analog Input - All Variations			
31	1	32-Bit Frozen Analog Input			
31	2	16-Bit Frozen Analog Input			
31	3	32-Bit Frozen Analog Input with Time of Freeze			
31	4	16-Bit Frozen Analog Input with Time of Freeze			
31	5	32-Bit Frozen Analog Input without Flag			
31	6	16-Bit Frozen Analog Input without Flag			
32	0	Analog Change Event - All Variations	1	06,07,08	04
32	1	32-Bit Analog Change Event without Time	1	06,07,08	
32	2	16-Bit Analog Change Event without Time	1	06,07,08	
32	3	32-Bit Analog Change Event with Time	1	06,07,08	
32	4	16-Bit Analog Change Event with Time	1	06,07,08	
33	0	Frozen Analog Event - All Variations			
33	1	32-Bit Frozen Analog Event without Time			
33	2	16-Bit Frozen Analog Event without Time			
33	3	32-Bit Frozen Analog Event with Time			
33	4	16-Bit Frozen Analog Event with Time			
40	0	Analog Output Status - All Variations	1	06	02
40	1	32-Bit Analog Output Status	1	06	
40	2	16-Bit Analog Output Status	1	06	

OBJECT			REQUEST		RESPONSE
Obj	Var	Description	Func Code (dec)	Qualifier Codes (hex)	Default Var. (hex)
41	0	Analog Output Block - All Variations			
41	1	32-Bit Analog Output Block	3,4, 5,6	17,28	echo of request
41	2	16-Bit Analog Output Block	3,4, 5,6	17,28	echo of request
50	0	Time and Date - All Variations			
50	1	Time and Date	2	07 where quantity=1	
50	2	Time and Date with Interval			
51	0	Time and Date CTO - All Variations			
51	1	Time and Date CTO			
51	2	Unsynchronized Time and Date CTO			
52	0	Time Delay - All Variations			
52	1	Time Delay Coarse (response for a restart request)	13		
52	2	Time Delay Fine (response for a delay measure request)	23		
60	1	Class 0 Data	1	06	
60	2	Class 1 Data	1	06,07,08	
60	3	Class 2 Data	1	06,07,08	
60	4	Class 3 Data	1	06,07,08	
80	1	Internal Indications	2	00 index=7	
81	1	Storage Object			
82	1	Device Profile			
83	1	Private Registration Object			
83	2	Private Registration Object Descriptor			

OBJECT			REQUEST		RESPONSE
Obj	Var	Description	Func Code (dec)	Qualifier Codes (hex)	Default Var. (hex)
90	1	Application Identifier			
100	1	Short Floating Point			
100	2	Long Floating Point			
100	3	Extended Floating Point			
101	1	Small Packed Binary-Coded Decimal			
101	2	Medium Packed Binary-Coded Decimal			
101	3	Large Packed Binary-Coded Decimal			
102	0	8-Bit Unsigned Integer			
102	1	8-Bit Unsigned Integer	1,2	04	
No Object			13		
No Object			23		

This completes the Universal Interface Module Operating Instructions.

Go to *Troubleshooting Instructions 1043-550*.