DNP Points List and Implementation for Voltage and Current Sensing Option

Table of Contents

DNP Points List for SG6801MSX Software

This instruction sheet provides Distributed Network Protocol (DNP) points and DNP implementation information for an 6801M Automatic Switch Operator applied in an IntelliTeam® SG Automatic Restoration System.

This "Points List" section is used with **SG6801MSXInstaller-7.6.x**. The "x" can indicate any number from 0 to 255. Other related software component version information is found on the *Setup>General>Revisions* screen.

The DNP master station should define the 6801M Automatic Switch Operator with the following Status, Analog Input, Control, Analog Output, and Counter points:

Point	Count
Status	130
Analog Input	32
Control	30
Analog Output	4
Counter	19

The available DNP points are listed in Tables 1 through 5 on pages 2 through 19 in the same order they are presented for selection on the *Setup>Communication>Point Mapping* screens. 6801M Status, Analog Input, and Control points can be assigned to any SCADA DNP point index. Point descriptions begin with a code number used to find the detailed definition in this instruction sheet. Refer to the "Communication Setup" section of S&C Instruction Sheet 1045M-530, "6801M Automatic Switch Operators: *Setup*." The code number for each point description is listed in this publication and is not the SCADA point index.

For a specific SCADA system, typically all 6801M Automatic Switch Operators operate with the same DNP point index configuration.

Unless otherwise noted, each point is on if the condition is logically true or active.

NOTICE

The source address in IntelliLink® Setup Software is now 65432 instead of 1.

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6801M Status Points

These 6801M Automatic Switch Operator features have multiple status points:

- **Open or Close**: 1–2
- **IntelliTeam SG System Operation**: 57–73, 84
- **Netlist Information**: 80–83

NOTICE

When uploading a setpoint or DNP points map file from any version earlier than 7.6.x into a 6801M Automatic Switch Operator with version 7.6.x firmware, the **Code Description** and **Class** fields for DNP Status Points associated with the **SAT** feature (**SAT In Progress**, **SAT Switch Contacts Closed**, **SAT Switch Contacts Open**, **SAT Prohibited Locally** and **SAT Ignore Open Disconnect**) if mapped will display "End" and "Class 1." These must be manually converted to "Reserved" and "No Event" respectively so the SCADA system receives static data for any points mapped beyond them.

Table 1. 6801M Status Points

Code #	Name—Definition
1	**Switch Open—**On if the actuator is positioned within the **Open** actuator limit range and the most recent switch operation completed without the switch operator detecting that the actuator was disengaged from the motor operator rod. Otherwise, off.
2	**Switch Closed—**On if the actuator is positioned within the **Closed** actuator limit range and the most recent switch operation completed without the switch operator detecting that the actuator was disengaged from the motor operator rod. Otherwise, off.
3	**Motor Operator Disabled (not ready)—**This point is set when normal, high-speed operation of the switch is blocked. Otherwise, off. This is a summary point. The exact cause of the **Motor Disabled** alarm can be determined when these status points are on: 8, 10, 16, 26, 30, 31, 32, 33, 34, 41, 42, 43, 44, 47, 48, 49, 51, or 55. If **Not Ready for Override** mode (Status Point 45) is also active, emergency **Open/Close** operations are blocked.
4	**Automatic Operation Enabled—**On when the **Automatic Operation** mode is enabled using either the faceplate switch or a SCADA command. Otherwise, off.
5	**SCADA Control Enabled—**On when the SCADA CONTROL faceplate switch is set to the **Remote** position. Otherwise, off.
6	**Overcurrent Fault Detected—**On when the fault-detection circuitry detects a **Line Fault** condition the SCADA operator has not reset. For a normally closed switch, line-fault conditions clear automatically when three-phase line voltage is sensed, the switch is in the **Closed** position, and 45 minutes have elapsed. For a normally open or normally closed switch, click on one of these options to manually clear the fault: the **Clear Faults** command in the **LCD** menu, the **Clear Faults** button on the *Setup>Site Related* screen, or the faceplate/screenset pre-assigned **User Command** button. **Note:** The **Fault** condition also clears if the conditions above are met and the switch control is reinitialized using the setup software or a SCADA command.
7	**Sectionalizer Tripped—**On when any **Automatic Control** mode opens the switch. The point is cleared when the switch is closed for any reason. It is also cleared on reinitialization of the switch operator using the setup software or when the SCADA CONTROL switch state is changed. Otherwise, off.
8	**Battery Bad—**On when battery replacement is required, unless the switch operator is operating or has recently been operating on battery power. Otherwise, off.

TABLE CONTINUED ▶

Table 1. 6801M Status Points—Continued

Code #	Name—Definition
9	**Maintenance Required—**On when some form of maintenance (other than battery replacement) is required. It is set when the battery charger stops functioning because of overvoltage or when the switch open/close contacts are not mutually exclusive. This is a summary point. An inspection of other status points can determine the exact cause. Otherwise, off.
10	**Switch Position is Inconsistent—**On when both contacts are closed or open. Otherwise, off.
11	**Ac Control Power Not Present—**On when ac control power is not available to the battery charger. This indicates the switch operator is operating on battery backup. Otherwise, off.
12	**Battery Low—**On when battery voltage is low, but the switch will operate. Otherwise, off.
13	**Battery Charger Problem—**On when the charging voltage applied to the battery system is too high and the charger is turned Off. Otherwise, off.
14	**Battery Test in Progress—**On when the switch operator is automatically testing the batteries at periodic intervals. During the test battery voltage fluctuates. Otherwise, off.
15	**Cabinet Door Open—**On when the enclosure door is open. When the door is closed this point is off and all power to the faceplate LEDs is turned off. Otherwise, off.
16	**Internal Temperature Sensor Bad—**On when the temperature sensor is reading out of range. Temperature-related correction factors will not be accurate when the sensor is incorrect. Otherwise, off.
17	**Phase A Overcurrent Fault—**On when the fault-detection circuitry detects a **Line Fault** condition the SCADA operator has not reset. For a normally closed switch, line fault conditions clear automatically when three-phase line voltage is sensed, the switch is in the **Closed** position, and 45 minutes have elapsed. For a normally open or normally closed switch, click on one of these options to manually clear the fault: the **Clear Faults** command in the **LCD** menu, the **Clear Faults** button on the *Setup>Site Related* screen, or the faceplate/screenset pre-assigned **User Command** button. **Note:** The **Fault** condition also clears if the conditions above are met and the switch control is reinitialized using the setup software or a SCADA command.
18	**Phase B Overcurrent Fault—**As noted in Status Point 17, for Phase B. Otherwise, off.
19	**Phase C Overcurrent Fault—**As noted in Status Point 17, for Phase C. Otherwise, off.
20	**Overcurrent Ground Fault—**As noted in Status Point 17, for ground. Otherwise, off.
21	**Loss of Voltage on Voltage Channel 1—**On when the voltage sensor on configured voltage channel 1 shows a **Loss of Voltage** status. Equipment may be configured with three voltage sensors or six voltage sensors. Otherwise, off.
22	**Phase A Reverse Current—**On when the current on Phase A is flowing in the direction opposite to the **Normal Direction** setting configured in the switch operator. The switch operator identifies a **Reverse Current** condition when the voltage-current phase angle deviates more than 90 degrees from the value set during installation for unity power factor. Otherwise, off.
23	**Phase B Reverse Current—**As noted in Status Point 22, for Phase B. Otherwise, off.
24	**Phase C Reverse Current—**As noted in Status Point 22, for Phase C. Otherwise, off.

TABLE CONTINUED ►

Table 1. 6801M Status Points—Continued

Code #	Name—Definition
25	**External Temperature Sensor Bad—**On when the temperature sensor is reading out of range. Temperature-related correction factors will not be accurate when the sensor is incorrect. Otherwise, off.
26	**Decoupled From Operator—**On when the switch operator detects that the switch is decoupled from the operator. It is cleared by entering **Align** mode and jogging the operator into the operating range.
27	**Motor Overload—**On when the switch operator detected a **Motor Overload** condition on the last operation. The condition is automatically cleared on the next operation. The switch operator detects motor overload by monitoring the voltage and current draw of the motor. An overload causes the motor to shut down after a brief delay, regardless of the output actuator position.
28	**Operator Undershoot On Last Operation—**On when the switch did not reach a fully **Open** or fully **Closed** position on the last operation. This is usually caused by a blockage in the switch contacts or external linkages.
29	**Operator Overshoot on Last Close—**On when the switch operator traveled too far on the **Close** operation. It is cleared on the next switch operation.
30	**Inspection Required—**On when inspection of the switch installation is required (after a motor overload or an undershoot on an **Open** or **Close** operation). This condition prevents normal operation of the switch but allows an **Override** operation. It is cleared by clicking the **Clear Warnings** button on the *Diagnostics>Warnings* screen.
31	**Calibration Required—**On when the output actuator travel limits need to be reset. The condition is set when an encoder error or an undershoot on an **Open** operation occurs. This prevents a normal high-speed operation of the switch but allows an **Emergency Override** operation. This point is cleared by setting the travel limits.
32	**Unrecoverable Error—**On when an internal error is detected. It is cleared by clicking the **Clear Errors** button on the *Diagnostics>Errors* screen.
33	**Motor Overload During Low Torque Operation—**On when a motor overload is detected on the last jog operation. It is cleared by clicking the **Clear Errors** button on the *Diagnostics>Errors* screen.
34	**Motor Overload During High Torque Operation—**On when a motor overload error is detected on a high-speed operation. It is cleared by clicking the **Clear Errors** button on the *Diagnostics>Errors* screen.
35	**Internal Bad Command—**On when the software is requested to perform an undefined type of operation. This is an impossible operating condition and is a microprocessor malfunction. It is cleared by clicking the **Clear Errors** button on the *Diagnostics>Errors* screen.
36	**Internal Bad State—**On when software has moved into an invalid operating state. This is an impossible operating condition and is a microprocessor malfunction. It is cleared by clicking the **Clear Errors** button on the *Diagnostics>Errors* screen.
37	**Bad Encoder Checksum—**On when the switch operator detects corruption of the information related to the absolute position of the output actuator. The drive train position is considered invalid and requires resetting the travel limits. It is cleared by clicking the **Clear Errors** button on the *Diagnostics>Errors* screen.

TABLE CONTINUED ▶

Table 1. 6801M Status Points—Continued

Code #	Name—Definition
38	**Bad Encoder Range—**On when the switch operator detected an impossible position of the output actuator (beyond the absolute operating range of the drive train). The drive train position is considered invalid and requires resetting the travel limits. It is cleared by clicking the **Clear Errors** button on the *Diagnostics>Errors* screen.
39	**Bad Encoder Runaway—**On when substantial motion of the drive train is detected without an operation being underway. Because the drive train gearbox is mechanically self-locking, this generally indicates some type of gearbox or position encoder malfunction. It is cleared by clicking the **Clear Errors** button on the *Diagnostics>Errors* screen.
40	**Bad Encoder Drift—**On when slight motion of the drive train is detected without an operation being underway. Because the drive train gearbox is mechanically self-locking this generally indicates some type of gearbox or position encoder malfunction. It is cleared by clicking the **Clear Errors** button on the *Diagnostics>Errors* screen.
41	**Overshot Position On Open—**On when the switch operator travels too far on an **Open** operation. It is cleared by clicking the **Clear Errors** button on the *Diagnostics>Errors* screen.
42	**Handle Not Stowed—**On when the manual operation handle is not stowed on the faceplate. Otherwise, off.
43	**Max Limit Spacing Exceeded—**On when the closed and open travel limits are more than 180° apart. This condition prevents both normal and override operation of the switch. It is cleared by clicking on the **Clear Warnings** button on the *Diagnostics>Warnings* screen.
44	**Manufacturing Variance Not Set—**On when the manufacturing variance set points have not been set. It is cleared by clicking on the **Clear Warnings** button on the *Diagnostics>Warnings* screen.
45	**Not Ready For Override—**On when a **Not Ready** condition blocks normal high-speed operation of the switch. It cannot be overridden using an emergency **Close/Open** operation. Otherwise, off.
46	**Align Mode—**On when the switch operator is in **Low-Speed** or **Align** mode. Active normal high-speed switching operations are blocked and faceplate **Close/Open** operations cause slow or jogging movement of the output actuator. The faceplate NOT READY LED is blinking. Otherwise, off.
47	**Limits of Travel Not Set—**On when the closed or open travel limit needs to be set. Otherwise, off.
48	**Battery Test Hardware Error—**On when a battery test hardware malfunction is detected during a battery test. The cause may be a malfunctioning battery test relay, a battery load test resistor problem, or a wiring problem. It is cleared on the next successful battery test. Otherwise, off.
50	**Sensor Detected Missing Encoder—**On when the shaft encoder cable is disconnected from the PS/IO board, is improperly installed, or there is a problem with the cable. Otherwise, off.
51	**Worn Switch—**On when the captured current profile exceeds the obstruction current threshold from the 125-ms mark to the 1.6-second mark. Otherwise, off. See S&C Instruction Sheet 1045M-550, “Automatic Switch Operators: *Troubleshooting*,” for more information.
52	**Knife Switch Not Engaged—**On when the knife switch is opened to visibly disconnect battery power to the motor. Otherwise, off. This point is only valid for catalog suffix option “-KS.”

TABLE CONTINUED ►

Table 1. 6801M Status Points—Continued

Code #	Name—Definition
53	**Surge Suppressor Tripped—**On when the optional lightning surge arrestor module trips. Otherwise, off. This point is only active when catalog suffix option "-W1" (ac surge protector) is specified.
54	**Switch Disabled Bad Battery—**On when the Battery Bad indication is active.
55	**Combination Battery—**On when either the **Battery Low** (Status Point 12) or **Battery Bad** (Status Point 8) mode is active. Otherwise, off.
56	**Interlock Open—**On when the key interlock locking bolt is in the extended position and the key can be removed. Otherwise, off. This point is only valid for catalog suffix options "-L2" and "-L3."
57	**Switch Operator Not Transfer Ready—**Active only for the reporting switch operator. On when a switch operator operation is not consistent with the expected team operation—for example, an incomplete or manual switch operation. This point is also active when **Motor Operator Disabled** (Status Point 3) is On or **Automatic Operation Enabled** (Status Point 4) is Off. Off when all local trouble indications have been cleared.
58	**Not All Teams Transfer Ready—**On when any team in which this switch operator is a member is not fully operational. This may be because of an individual team member condition, team-wide conditions such as isolating a fault, configuration or coordination problems, or **Automatic Restoration** mode is set to "Prohibited" on the *IntelliTeam SG Operation* screen. Off when all conditions that caused this status point to be set initially have been cleared. Otherwise, off. Unless otherwise prohibited, team member switch operators will revert to standalone sectionalizing logic when the **Not Transfer Ready** condition (this status point) is active in any team that this switch operator participates in, whether caused by local conditions or conditions at adjacent team members.
59	**Automatic Transfer Operation in Progress—**On when any team defined in the control is actively performing an **Automatic Transfer** operation. Otherwise, off.
60	**Automatic Return to Normal Operation in Progress—**On when any team defined in the switch operator is actively performing an automatic **Return to Normal** operation. Otherwise, off.
61	**Setup Data Revision—**On when the setup configuration data for any enabled team defined in the switch operator is modified. It remains on until the **Team Setup** setpoint on the *Setup>Team* screen has been toggled from **Stopped** mode back to **Running** mode for any team where the setup data have been changed.
62	**Restoration Prohibited by SCADA—**On when this switch operator received the command to **Prohibit Load Restoration** (Control Point 10) from the SCADA master or the **Prohibit Restoration** mode was **Enabled** on the *IntelliTeam SG>General>Team Summary* screen. While this point is on, no switch on any team in which this switch operator participates will be allowed to automatically close, preventing automatic load restoration. This point is off when the **Prohibit Restoration** mode is **Latched Off** with a command from the SCADA master (Control Point 10) or is disabled on the *IntelliTeam SG>General>Team Summary* screen. Otherwise, off.
63	**Restoration Prohibited by Team Timer—**On when the team transfer process timer has expired in this switch operator, resulting in the **Prohibit Restoration** mode being enabled for at least one of the teams in which this switch operator participates. Only a team for which this timer has expired will be prohibited from further automatic load restoration. This point will be cleared when the **Prohibit Restoration Latch Off** (Control Point 10) message is received or the **IntelliTeam SG Restoration** mode is enabled using the *IntelliTeam SG>General>Team Summary* screen. Otherwise, off.

TABLE CONTINUED ▶

Table 1. 6801M Status Points—Continued

Code #	Name—Definition
64	**Source Loading Data is Active—**On when the **Real-Time Feeder Loading** logic is active and in use. This point does not indicate whether the control is using actual real-time feeder loading data received from a DNP master or the **Default Source Segment Loading** setting. Otherwise, off.
65	**Real-Time Load Data May be Old or Abnormal—**On when the DNP analog output value received is less than the real-time three-phase total load as sensed by the switch. It is also set if the real-time feeder-loading data have not updated within the configured time interval. Off when new data are received and the analog value is equal to or greater than the local measured load. Otherwise, off.
66	**Team 1 Ready to Transfer—**On when the team is in the **Ready to Transfer** state. This point is off if the team is not in use, contains an **Error** condition, or the line section represented by the team contains a fault.
67	**Team 2 in Ready to Transfer—**On when the team is in the **Ready to Transfer** state. This point is off if the team is not in use, contains an **Error** condition, or the line section represented by the team contains a fault.
68	**Team 3 in Ready to Transfer—**On when the team is in the **Ready to Transfer** state. This point is off if the team is not in use, contains an **Error** condition, or the line section represented by the team contains a fault.
69	**Team 4 in Ready to Transfer—**On when the team is in the **Ready to Transfer** state. This point is off if the team is not in use, contains an **Error** condition, or the line section represented by the team contains a fault.
70	**Team 5 in Ready to Transfer—**On when the team is in the **Ready to Transfer** state. This point is off if the team is not in use, contains an **Error** condition, or the line section represented by the team contains a fault.
71	**Team 6 in Ready to Transfer—**On when the team is in the **Ready to Transfer** state. This point is off if the team is not in use, contains an **Error** condition, or the line section represented by the team contains a fault.
72	**Team 7 in Ready to Transfer—**On when the team is in the **Ready to Transfer** state. This point is off if the team is not in use, contains an **Error** condition, or the line section represented by the team contains a fault.
73	**Team 8 in Ready to Transfer—**On when the team is in the **Ready to Transfer** state. This point is off if the team is not in use, contains an **Error** condition, or the line section represented by the team contains a fault.
74	**Loss of Voltage on Any Phase—**On when loss of voltage is detected on any phase. Otherwise, off.
75	**Hot Line Tag Enabled—**On when the **Hot Line Tag** mode is in the **Enabled** state. Otherwise, off.
76	**Overcurrent Fault on Any Phase—**On when fault current is sensed on any phase. Otherwise, off.
77	**Tripped to Lockout—**On when the switch operator is in the **Lockout** state as the result of an event. The IntelliTeam system may begin the reconfiguration process. Off when a command to close the switch operator is received.
78	**Manual Operation Detected—**On when the IntelliTeam system senses the switch operator has been operated manually. Otherwise, off.
79	**IntelliTeam Switch Status Open—**Indicates the IntelliTeam system has properly received the switch status. This point should always agree with the **Switch Open** command (Status Point 1). Otherwise, off.
80	**Netlist Missing Runners—**On when the received runner count does not match the expected runner count. The **Rapid Self-Healing** feature is disabled as long as this is true. Otherwise, off.

TABLE CONTINUED ►

Table 1. 6801M Status Points—Continued

Code #	Name—Definition
81	**Netlist Settings Propagation—**On when the local control is receiving Netlist records from either a download or through propagation. If this is a Netlist download, the status point remains on until all expected runners arrive with the new Netlist. Otherwise, off.
82	**Netlist Settings Accepted—**On when a new Netlist has been successfully validated. Off when a Netlist is being downloaded or propagated. Off if the user has changed any team settings so they are different from the screenset. Otherwise, off.
83	**Netlist Propagation Enabled—**On when the IntelliLink software screenset or SCADA enables Netlist propagation. Otherwise, off. (Starting from version 7.1.x, the **Netlist Propagation** mode is always "Enabled;" therefore, this status point is always on.)
84	**IntelliTeam II Mode Active—**On when the IntelliTeam® II Automatic Restoration System software is in use. Otherwise, off.
85	**IT Out of Normal Switch State—**On when the switch is not in the **Normally Open** or **Normally Closed** state for the IntelliTeam system. Off when the switch is in the **Normally Open** or **Normally Closed** state for the IntelliTeam system. Otherwise, off.
86	**PLI Open—**On when the switch has been opened by the **Phase-Loss Isolation** (PLI) logic. Otherwise, off.
87	Not in use, always inactive.
88	Reserved.
89	Reserved.
90	Reserved.
91	Reserved.
92	Reserved.
93	**Wi-Fi Is Connected—**On when a Wi-Fi connection to the switch operator is established. Otherwise, off.
94	**Wi-Fi Intrusion Alarm—**On when the Wi-Fi module reports a replay attack or improper authentication. Turned off by the user with Control Point 16, "Clear Wi-Fi Intrusion Alarm."
95	**Wi-Fi Disabled by SCADA—**On when a **Disable Wi-Fi** command (Control Point 13) is received. Off when an **Enable Wi-Fi** command (Control Point 14) is received. An **Enable/Disable Wi-Fi** command (Control Point 12) toggles Wi-Fi communication on and off; on when Wi-Fi is disabled and off when Wi-Fi is enabled. Otherwise, off.
96	**Warning—**On when any warning is active Otherwise, off.
97	**Alarm—**On when any alarm is active. Otherwise, off.
98	**Error—**On when any error is active. Turned off by a user action to clear error.
99	**Switch 1 Phase A Loss of Voltage—**On when voltage is below the configured **Loss of Voltage Threshold** setting. Otherwise, off.
100	**Switch 1 Phase B Loss of Voltage—**On when voltage is below the configured **Loss of Voltage Threshold** setting. Otherwise, off.

TABLE CONTINUED ►

Table 1. 6801M Status Points—Continued

Code #	Name—Definition
101	**Switch 1 Phase C Loss of Voltage—**On when voltage is below the configured **Loss of Voltage Threshold** setting. Otherwise, off.
102	**Switch 1 Phase D Loss of Voltage—**On when voltage is below the configured **Loss of Voltage Threshold** setting. Otherwise, off.
103	**Switch 1 Phase E Loss of Voltage—**On when voltage is below the configured **Loss of Voltage Threshold** setting. Otherwise, off.
104	**Switch 1 Phase F Loss of Voltage—**On when voltage is below the configured **Loss of Voltage Threshold** setting. Otherwise, off.
105	**Comm System has Poor Quality—**On when the **Bad Health** alarm is active on the *Link Keep Alive Tests* screen and/or the *Diagnostic Communications Tests* screen. Otherwise, off.
106	**DSP Event Overflow—**On when an overflow error occurred in the **DSP** operation. Off after a **Clear Warnings** command has been issued from the *Diagnostics>Warnings* screen or DNP Control Point 18.
107	**DSP Reset—**On after a DSP reset occurred. Off after a **Clear Warnings** command has been issued from the *Diagnostics>Warnings* screen or DNP Control Point 18.
108	**DSP Configuration Error—**On after a DSP Configuration error occurred. Off after a **Clear Warnings** command has been issued from the *Diagnostics>Warnings* screen or DNP Control Point 18. If the error has not been cleared prior to the indication being cleared the indication will reassert.
109	**DSP Operation Suspended—**On after the **DSP** operation has ceased. Off after a **Clear Warnings** command has been issued from the *Diagnostics>Warnings* screen or DNP Control Point 18. If the operation has not been restarted prior to the indication being cleared the indication will reassert.
110	**DSP Xbus Communication Error—**On when an error has occurred on the XBus. Off after a **Clear Warnings** command has been issued from the *Diagnostics>Warnings* screen or DNP Control Point 18.
111	**DSP Flash CRC Error—**On when a DSP CRC error has been detected. Off after a **Clear Warnings** command has been issued from the *Diagnostics>Warnings* screen or DNP Control Point 18.
112	**DSP ADC Overflow—**On after an ADC overflow has occurred. Off after a **Clear Warnings** command has been issued from the *Diagnostics>Warnings* screen or DNP Control Point 18.
113	**DSP Bad Address Latch—**On after a bad address latch has been detected. Off after a **Clear Warnings** command has been issued from the *Diagnostics>Warnings* screen or DNP Control Point 18.
114	**DSP Not Running—**On when the DSP has stopped running. Off after a **Clear Warnings** command has been issued from the *Diagnostics>Warnings* screen or DNP Control Point 18. If DSP has not been restarted prior to the indication being cleared the indication will reassert.
115	**DSP In Diagnostic Mode—**On when the DSP is in the **Diagnostic** mode. Off after a **Clear Warnings** command has been issued from the *Diagnostics>Warnings* screen or DNP Control Point 18. If DSP has not been taken out of **Diagnostic** mode prior to the indication being cleared the indication will reassert.

TABLE CONTINUED ►

Table 1. 6801M Status Points—Continued

Code #	Name—Definition
116	**IntelliLink Intrusion—**On when an IntelliLink software log-in attempt failed three times, after which all users are locked out for 15 minutes. Otherwise, off.
117	**IntelliLink Session Active—**On when a user is presently logged in to the control. Otherwise, off.
118	**Not all Teams Xfer Ready for X sec—**On when any team in which this control is a member is in the **Out of Ready** state for a time exceeding the **Not All Teams Transfer Ready for X Seconds** timer. The status point becomes inactive when a new valid coach arives and the team goes back into the **Ready** state.
119	**Prohibit Restoration Remotely Transmitted—**On when the local device sends the **Prohibit Restoration SCADA** command to remote devices in the Remote Prohibit Restoration Transmit List table because of an active **Hot Line Tag**, **Frequency Trip**, or **Manual Operation** state, or when a **Prohibit Restoration** state is activated via a front panel, IntelliLink software, or SCADA command. The status point is cleared when the device receives a **Clear Remote Prohibit Restoration Status** command from SCADA. Status point = 0x1F00.
120	**Enable Restoration Remotely Transmitted—**On when the local device sends the **Clear Remote Prohibit Restoration Status** command to remote devices in the Remote Prohibit Restoration Transmit List table. This event can be triggered by executing a **Clear Remote Prohibit Restoration Status** command via IntelliLink software or receiving an **IT Clear PR to all Devices** command from SCADA. The status point is cleared when the device receives the **Clear Remote Enable Restoration Status** control point. Status point = 0x1F01.
121	**Transfer Trip Enabled—**On when the **Transfer Trip** state is enabled to allow the local device to send an **Initiate Transfer Trip** command to all non-zero RTU addresses in the Remote Transfer Trip Transmit List table after an **Open and Lockout** state because of a **Protection** or **Automatic Sectionalizing** operation. Status point = 0x1F02.
122	**Disregard First Overcurrent Active—**On when the **Disregard First Overcurrent** setting is enabled. When enabled, the IntelliTeam system disregards the first overcurrent event when a fault is detected on the circuit and does not count it as a fault. Instead, it waits until after the first **Reclose/PulseClosing® Technology** sequence to allow the distributed generation to be taken offline and then starts counting fault events from that point forward. Otherwise, off.
123	**Normal Current Direction—**On when the device is properly configured and power is flowing through the circuit in the normal direction. Status point = 0x167.
124	**Reverse Current Direction—**On when the device is configured incorrectly or circuit conditions cause the direction of current flow to reverse, possibly because of distributed generation on the circuit. Status point = 0x168.
125	**Transfer Trip Prohibit Restoration Initiated—**On when an **Initiate Transfer Trip** control point has been received and executed. Off when the **Prohibit Restoration** state is no longer active and the control will be allowed to close by an automatic or manual operation. **Note:** This status point only applies to devices not teamed with a distributed generation source. When teamed with distributed generation, this status point will not get activated, even if a **Transfer Trip** command is initiated and executed. Status point = 0x021C.
126	**Remote Prohibit Restoration Enabled from Local—**On when the **Enable Remote Transmit from Local P.R.** setting is enabled on the local device. Status point = 0x1F03.

TABLE CONTINUED ►

Table 1. 6801M Status Points—Continued

Code #	Name—Definition
127	**Remote Prohibit Restoration Enabled from SCADA—**On when the **Enable Remote Transmit from SCADA P.R.** setting is enabled on the local device. On when the switch operator receives a **Prohibit Restoration** command from a SCADA **Latch-On** command. Status point = 0x1F04.
128	**DG Reconnect Delay Terminated—**The **DG Reconnect Delay** timer is aborted because of an abnormal system condition. The **Transfer Trip Prohibit Restoration** state remains active on the device and reconnecting the distributed generation source back on the grid must be performed manually.
129	**Transfer Declined Excess Load—**Applies to all active teams configured within a control. Active when a transfer attempt has been declined because of load within the team(s) to be restored that exceeds the present capacity of the alternate source. Otherwise, off if another reason for the declined transfer occurs at the same control, if the transfer stops because of a **Prohibit Restoration** or other error condition at any team member of this team, if the transfer succeeds at any team member of this team, or 5 minutes passes at this control with no further transfer declined conditions as a result of excessive loading.
130	**Transfer Declined Segment Limit—**Applies to all active teams configured within a control. Active when a transfer attempt has been declined because of the number of teams being requested for restoration exceeding the **Line Segment** limit associated with the alternate source. Otherwise, off if another reason for the declined transfer occurs at the same control, if the transfer stops because of a **Prohibit Restoration** or other error condition at any team member of this team, if the transfer succeeds at any team member of this team, or 5 minutes passes at this control with no further transfer declined conditions as a result of **Line Segment** limit.
131	**System Voltage Unrecognized—**Active when the local system voltage is not recognized as a supported system voltage. It remains active until the issue is resolved through correct configuration of the system voltage setting.
132	**Xfer Trip PR Initiated (DG POI)—**Active when the DG POI device has received a **Transfer Trip** message and has initiated **Prohibit Restoration** on the POI IntelliTeam system device. Otherwise, off when the DG POI device is in any other state.
133	**NET: Missing Runners in Adjacent FeederNet—**Active when a missing runner condition exists in any adjacent FeederNet in an IntelliTeam system. Otherwise, off if there are no missing runner conditions in any adjacent FeederNet in an IntelliTeam system.
134	**Transfer Trip Sent—**Active when a device sends a **Remote Transfer Trip** message via the Remote Transmit list after it has opened and locked out because of a Protection or Automatic Sectionalizing event. It is cleared when the device is closed and in the **Ready** state.
135	**PR Due To Load Shed—**On when a Load Shedding event occurs at a team with a **Load Priority** setting configured in the do-not-restore range 20 to 25, activating a **Prohibit Restoration** state for that team. This point will be off when the source circuit returns to normal allowing the **PR Due To Load Shed** status point to clear or when the **Prohibit Restoration** state is cleared by local command or SCADA command.
136	**GPS Not Active Time Source—**On when the **GPS** feature is not the active time source. Otherwise, off.
137	**Shots to Lockout Status Switch 1—**On when **Shots to Lockout** feature is active. Otherwise, off.

Table 2. 6801M Analog Input Points

Code #	Name—Definition
1	**90% Voltage Reference Standard—**A constant representing 90% of the full-scale value.
2	**0% Voltage Reference Standard—**A constant representing the zero value.
3	**Neutral Current—**Taken as the vector sum of the phase currents on Phases A, B, and C. Current is measured using true RMS techniques and is reported in units of one count equals one ampere.
4	**Current, Pole A—**Single-phase true RMS current measured on Phase A. Each count equals one ampere.
5	**Current, Pole B—**Single-phase true RMS current measured on Phase B. Each count equals one ampere.
6	**Current, Pole C—**Single-phase true RMS current measured on Phase C. Each count equals one ampere.
7	**Voltage A, Pole A Jaw Side—**Single-phase voltage measured on Phase A of Switch 1. Voltage is measured using true RMS techniques and scaled to yield a nominal value of 120 Vac. Configuration of the switch operator at installation provides the scaling factors such as voltage transformer turn ratio, etc. In cases where loads are connected in a delta (phase-to-phase) configuration, the switch control sensor conditioning module is jumpered to yield phase-to-phase voltage readings. Voltage is reported in units of one sensor count equals 0.1 Vac RMS.
8	**Voltage B, Pole B Jaw Side—**Phase-to-ground or phase-to-phase voltage, depending on setup, measured on Pole B. Each count equals 0.1 Vac RMS.
9	**Voltage C, Pole C Jaw Side—**Phase-to-ground or phase-to-phase voltage, depending on setup, measured on Pole C. Each count equals 0.1 Vac RMS.
10	**Voltage D, Pole A Hinge Side—**Phase-to-ground or phase-to-phase voltage, depending on setup, measured on Pole D. Each count equals 0.1 Vac RMS.
11	**Voltage E, Pole B Hinge Side—**Phase-to-ground or phase-to-phase voltage, depending on setup, measured on Pole E. Each count equals 0.1 Vac RMS.
12	**Voltage F, Pole C Hinge Side—**Phase-to-ground or phase-to-phase voltage, depending on setup, measured on Pole F. Each count equals 0.1 Vac RMS.
13	**Phase Angle, on Pole A—**Each count equals 0.125 degrees.
14	**Phase Angle, on Pole B—**Each count equals 0.125 degrees.
15	**Phase Angle, on Pole C—**Each count equals 0.125 degrees.
16	**Single-Phase kvars, Pole A—**Kvars (volt-amperes, reactive) are calculated from single-phase true RMS voltage, current sensor values, and the respective voltage-current phase angle. Each count equals one kvar.
17	**Single-Phase kvars, Pole B—**As noted in Analog Input Point 16, for Phase B.
18	**Single-Phase kvars, Pole C—**As noted in Analog Input Point 16, for Phase C.
19	**Cabinet Temperature—**Reported in units of degrees Fahrenheit. Each count equals one degree.
20	**Battery Voltage—**Nominally 24 Vdc. If ac power is on this value is updated only during battery testing. If ac power is off this value is continuously updated. One count equals 0.035 Vdc.
21	**Single-Phase kW, Pole A—**Calculated using instantaneous voltage and current, and the respective voltage-current phase angle. Each count equals one kW.

TABLE CONTINUED ►

Table 2. 6801M Analog Input Points—Continued

Code #	Name—Definition
22	**Single-Phase kW, Pole B—**Calculated using instantaneous voltage and current, and the respective voltage-current phase angle. Each count equals one kW.
23	**Single-Phase kW, Pole C—**Calculated using instantaneous voltage and current, and the respective voltage-current phase angle. Each count equals one kW.
24	**Single-Phase kVA Pole A—**Each count equals one kVA.
25	**Single-Phase kVA Pole B—**Each count equals one kVA.
26	**Single-Phase kVA Pole C—**Each count equals one kVA.
27	**Total kvars—**Sum of kvar Phase A, kvar Phase B, and kvar Phase C. Each count equals one kvar.
28	**Total kW—**Sum of kW Phase A, kW Phase B, and kW Phase C. Each count equals one kW.
29	**Total kVA—**Sum of kVA Phase A, kVA Phase B, and kVA Phase C. Each count equals one kVA.
30	**Hours Until Battery Low—**Provides an approximate time to the **Battery Low** condition if no operations are performed. Each count equals one hour.
31	**External Temperature—**Reports the temperature in degrees Fahrenheit. Each count equals one degree.
32	**Switch Actuator Position—**Provides the position of the actuator in angular degrees. Each count equals 0.1 degree.

The object type must be configured on the *Setup>Point Mapping>Controls* screen for each control point when it is mapped. Only the configured object type will be accepted and acted on for that control point. Some control points will not work with all object types. The available object types are listed for each control point.

- Control points related to **Open** or **Close** command: 1.
- Control points related to the IntelliTeam SG system: 9–11.

Table 3. 6801M Control Points

Code #	Name—Definition
1	**Open or Close—SCADA—**This command opens or closes the switch. **Note:** These commands are ignored if the **Not Ready** condition (Status Point 3) is active. These commands are also ignored and return an error if the SCADA CONTROL switch is not in the **Remote** position.
2	**Close Shots-to-Lockout—**This command may be issued using either the **Select/Operate** sequence, the **Direct Operate** function, or the **Direct Operate without Ack** function. Only a **Close** command is valid for this point. This command is ignored and returns an error if the switch is not open or the **Automatic Operation** mode is not enabled.
3	**Clear any Outstanding Overcurrent Fault Conditions Present—**This command must be issued using a pulse on request. The fault condition otherwise remains active for 45 minutes after the switch is closed and ac power is fully restored or until the REMOTE/LOCAL switch is operated.
4	**Enable/Disable Automatic Operation—**This command must be issued using the **Latch On/Off** request in the control relay output block. In **Automatic** mode, the switch operator automatically opens the switch if a preconfigured recloser sequence is recognized after a detected fault. **Note:** The **Automatic Operation** mode is not disabled when the faceplate REMOTE/LOCAL switch is set to the **Local** operation state.
5	**Start Battery Test—SCADA—**This command may be issued using a **Pulse-On** or **Latch-On** command. If ac power is available, the battery charger is disconnected for several minutes during the test. If ac power is not available, a brief impedance test is used to evaluate the battery condition.
6	**Override Operation with Auto-Reverse—**This command may be issued using either the **Select/Operate** sequence, the **Direct Operate** function, or the **Direct Operate without Ack** function.
7	**Override Operation without Auto-Reverse—**This command may be issued using either the **Select/Operate** sequence, the **Direct Operate** function, or the **Direct Operate without Ack** function.
8	**Exit Align Mode—**This command must be issued using a **Pulse On** request.
9	**IntelliTeam Clear Manual Operation Status—SCADA—**A **Pulse-On** or **Latch-On** command is used to clear a manual operation. This command allows the IntelliTeam system to return to the **Ready** state provided the switches are in their IntelliTeam **Normally Open** or **Normally Closed** states.
10	**IntelliTeam Prohibit Restoration—**This command must be issued using the **Latch On/Off** request in the control relay output block. The **Latched On** command prevents the local switch and any switches in any team in which this switch operator participates from automatically closing to restore load under any circumstances.
11	**Netlist Propagation Enable/Disable—**In the **Enabled** state, allows new Netlist requests and Netlist transmissions. In the **Disabled** state, multiple downloads of a Netlist can be sent to a local control. (Starting from version 7.1.x, the **Netlist Propagation** mode is always “Enabled;” therefore, this control point does not operate.)

TABLE CONTINUED ▶

Table 3. 6801M Control Points—Continued

Code #	Name—Definition
12	**Enable/Disable Wi-Fi—**This command enables or disables local Wi-Fi communication.
13	**Wi-Fi Disable—**This command disables local Wi-Fi communication.
14	**Wi-Fi Enable—**This command enables local Wi-Fi communication.
15	**Wi-Fi Test—**This Command activates the Wi-Fi beacon transmitter for troubleshooting purposes.
16	**Clear Wi-Fi Intrusion Alarm—**This command clears an active **Wi-Fi Intrusion** alarm.
17	**Clear Errors—**Clears all error flags. Alarms and warnings are not affected.
18	**Clear Warnings—**Clears all warning flags. Errors and alarms are not affected. The **Active Warnings** function will reassert in approximately one second.
19	**Clear Alarms—**Clears all alarm flags. Errors and warnings are not affected. The **Active Alarms** function will reassert in approximately one second.
20	**Enable/Disable Hot Line Tag—SCADA—**The **Enable** command may be issued using a **Latch-On** or **Pulse-On** command. The **Disable** command may be issued using the **Latch-Off** or **Pulse-Off** command. The default object type is “Latch.”
21	**Clear IntelliLink Intrusion—**This command clears the **IntelliLink Intrusion** status point 116.
22	**Clear Remote Prohibit Restoration Status—**This command clears the **Prohibit Restoration Remotely Transmitted** status point 119. Control point = 0x1F00.
23	**Clear Remote Enable Restoration Status—**This command clears the **Enable Restoration Remotely Transmitted** status point 120. Control point = 0x1F01.
24	**Remote Transmit Enable Restoration—**When received, the device clears the **Prohibit Restoration** state locally (only if the **Hot Line Tag**, **Frequency Trip**, or **Manual Operation** states are not active) and then sends a **Clear Prohibit Restoration** command to all devices in the Remote Prohibit Restoration Transmit List table. The **Enable Remote Transmit from SCADA P.R.** setting must be enabled to perform this action. Control point = 0x1F02.
25	**Initiate Transfer Trip—**This command sets the **Transfer Trip** state on a single device. The device issues a command to **Open** the switch in **Automatic** mode (not a manual operation) and verifies the operation. If an **Open** state is confirmed, the device then activates the **Prohibit Restoration** state on the team facing the distributed generation source (unless it’s a distributed generation team) to prevent restoration of that line segment. For the **Prohibit Restoration** state to be set, the receiving device must be an S&C switch control that is part of an IntelliTeam SG system. SW1 = 0x202, SW2 = 0x203.
26	**Enable/Disable Transfer Trip—**When enabled, the local device sends an Initiate **Transfer Trip** command to all non-zero RTU addresses in the remote transfer trip transmit list table following an **Open and Lockout** state because of a Protection or Automatic Sectionalizing event. When disabled, no condition will result in sending an **Initiate Transfer Trip** command to remote devices. Control point = 0x1F03.
27	**Enable/Disable DIFF—**This command enables or disables the Disregard First Overcurrent function.

Table 3. 6801M Control Points—Continued

Code #	Name—Definition
28	**Enable/Disable Remote Prohibit Restoration from Local—**When enabled, a local **Prohibit Restoration** command (via the front panel or IntelliLink software) will place the device in a **Prohibit Restoration** state and then transmit a **Prohibit Restoration** command to all devices in the remote prohibit restoration transmit list. Control point = 0x1F04.
29	**Enable/Disable Remote Prohibit Restoration from SCADA—**When enabled, the device will enter a **Prohibit Restoration** state and then transmit a **Prohibit Restoration** command to all devices in the Remote Prohibit Restoration Transmit list if any the following states are active: **Hot Line Tag**, **Frequency Trip**, **Manual Operation**, or the **Prohibit Restoration** mode is activated from a SCADA command. Control point = 0x1F05.
30	**Clear Manual Op Any State—**When executed, the manual operation on a device is cleared and the device goes into the **Ready** state. The device can be in an abnormal state (i.e. abnormally open or abnormally closed) or in its normal state (normally open or normally closed).

Table 4. 6801M Analog Output Points

Code #	Name—Definition
1	**Application Layer Confirmation Retry Time—**Time (100 to 65,535 ms) the switch operator will wait for an application-layer confirmation to an event response message before resending the request for confirmation.①
2	**Application Layer Confirmation Retry Count—**Number of times (0 to 10) the switch operator will send an event response message if a confirmation is not received. This number includes the initial response. The retry count is only in effect when the confirmation process is enabled.
3	**Control Point Select Time—**During a select-before-operate procedure, the time (10 to 1000 tenths of a second) allowed to elapse between receiving the **Select** function for a point and receiving the **Operate** function for it. If an **Operate** function is not received within this period, the point is deselected and another **Select** function is required before the point will operate.
4	**Real-Time Feeder Loading—**Total averaged three-phase feeder loading (in amperes), measured at the source breaker. This value is used to determine whether the load can be transferred to another source. Each count equals one ampere.

① Set and read the **Application Layer Confirmation Retry Time** setpoint based on the required range:

Application Layer Confirmation Retry Time Range	Set Analog Output Value	Read Analog Output Value
100 to 32,737 ms	Group 41 variation 2 (16-bit)	Group 40 variation 2 (16-bit with flag)
32,738 to 65,535 ms	Group 41 variation 1 (32-bit)	Group 40 variation 1 (32-bit with flag)

Note: Class 0 will always report group 40 variation 2 and will report negative value for 32-bit values. Use group 40 variation 1 to read values between 32,738 to 65,535 ms.

Table 5. 6801M Counter Points

Code #	Name—Definition
1	**Close Operation Count—**This is the number of switch operations. The counter is incremented on each **Close** operation. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.
2	**New Coach Generated On Team—**This is the number of coach generations on the team. The counter is incremented on each coach generation. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.
3	**Team Communication Error—**This is the number of communication problems. The counter is incremented on each communication problem. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.
4	**Unexpected State Change—**This is the number of unexpected state changes. The counter is incremented on each unexpected state change. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.
5	**Rebuilding Coach—**This is the number of **Coach Rebuild** operations. The counter is incremented on each **Coach Rebuild** operation. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.
6	**Error Writing Coach Entry on Task List Full—**This is the number of errors entering the coach on the task list. The counter is incremented on each error. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.
7	**Error Writing Communication Entry on Task List Full—**This is the number of errors putting a communication entry on the task list. The counter is incremented on each error. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.
8	**Error Writing Event on the Task List Full—**This is the number of errors putting an event on the task list. The counter is incremented on each error. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.
9	**Error Writing Member on the Task List Full—**This is the number of errors putting a member on the task list. The counter is incremented on each error. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.
10	**Sequence Number Resynchronization—**This is the number of sequence number re-synchronizations. The counter is incremented on each re-synchronization operation. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.
11	**Compact Flash Operational Issue—**This is the number of flash memory issues. The counter is incremented on each flash memory issue. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.
12	**Logging Overflow—**This is the number of log overflows. The counter is incremented on each log overflow. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.
13	**Disk Error—**This is the number of disk problems. The counter is incremented on each disk problem. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.
14	**Wi-Fi Intrusion Attempt—**This is the number of Wi-Fi intrusion attempts. The counter is incremented on each Wi-Fi intrusion attempt. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.
15	**Phase A Overcurrent Count—**This is the number of Phase A overcurrent events. The counter is incremented with each new overcurrent event. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.

TABLE CONTINUED ▶

Table 5. 6801M Counter Points—Continued

Code #	Name—Definition
16	**Phase B Overcurrent Count—**This is the number of Phase B overcurrent events. The counter is incremented with each new overcurrent event. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.
17	**Phase C Overcurrent Count—**This is the number of Phase C overcurrent events. The counter is incremented with each new overcurrent event. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.
18	**Phase Neutral Overcurrent Count—**This is the number of Neutral overcurrent events. The counter is incremented each new overcurrent event. This is a 32-bit counter and will overflow back to zero at 4,294,967,295.
19	**IntelliLink Intrusion Attempt—**This is the number of IntelliLink software log-in attempts that failed three times, after which all users are locked out for 15 minutes.

Table 6. 6801M Group 0 Objects

Variation	Variation Name	Definition
204	Device location longitude	This is the longitude of the control provided by GPS in decimal degree based on the WGS84 reference. A value of zero is returned when a GPS signal is not available, the **Fix Quality** setting is "Invalid," or no GPS module is installed. When the GPS module is installed, the present position is always returned, even when **GPS** mode is not selected for the **Time Source Synchronization** setpoint on the *Setup>General>Time* screen.
205	Device location latitude	This is the latitude of the control provided by GPS in decimal degree based on the WGS84 reference. A value of zero is returned when a GPS signal is not available, the **Fix Quality** setting is "Invalid," or no GPS module is installed. When the GPS module is installed, the present position is always returned, even when **GPS** mode is not selected for the **Time Source Synchronization** setpoint on the *Setup>General>Time* screen.
242	Device manufacturer's software version	The S&C implementation returns a string containing the MCU Application and MCU EOS. The following is an example of the string that will be returned: "003.003.004.003 060.001.021.043," representing MCU Application 3.3.4.3, MCU EOS 60.1.21.43.
248	Device serial number	The S&C implementation returns a string containing the 6801M Switch Operator serial number. The following is an example of the string that will be returned: 14T000001 (14 is the year, T indicates Toronto, and the rest of the serial number resets to 000001 at the beginning of the next year).

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.

Table 7 describes the compatibility of S&C's implementation of DNP with other devices:

Table 7. Device Profile Description

DNP 3 DEVICE PROFILE DOCUMENT	
Vendor Name: S&C Electric Company	
Device Name: 6801M Automatic Switch Operator	
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 - 249 Received - 249
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 1 to 25 and infinite
Requires Data Link Layer Confirmation: X Never _ _ Always _ _ Sometimes If "Sometimes," when? _ _ Configurable If "Configurable," how?	

TABLE CONTINUED ►

Table 7. Device Profile Description—Continued

Requires Application Layer Confirmation:

_ _ Never
_ _ Always (not recommended)
_ _ When reporting Event Data (Slave devices only)
_ _ When sending multi-fragment responses (Slave devices only)
_ _ Sometimes If "Sometimes," when?
X Configurable If "Configurable," how?

Timeouts while waiting for:

Data Link Confirm	X	None	_ _	Fixed	_ _	Variable	_ _	Config
Complete Appl. Fragment	X	None	_ _	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 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	X	Never	_ _	Always	_ _	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 for explanation)

TABLE CONTINUED ▶

Table 7. Device Profile Description—Continued

<table>
<tr><td colspan="2">FILL OUT THE FOLLOWING ITEM FOR MASTER DEVICES ONLY:</td></tr>
<tr><td colspan="2">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)</td></tr>
<tr><td colspan="2">FILL OUT THE FOLLOWING ITEMS FOR SLAVE DEVICES ONLY:</td></tr>
<tr><td>Reports Binary Input Change Events when no specific variation requested:
_ _ Never
_ _ Only time-tagged
X Only non-time-tagged
_ _ Configurable to send both</td><td>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)</td></tr>
<tr><td>Sends Unsolicited Responses:
_ _ Never
X Configurable (explain)
_ _ Only certain objects
_ _ Sometimes (explain)
_ _ Enable/Disable Unsolicited Function codes supported
(see Note 3)</td><td>Sends Static Data in Unsolicited Responses:
_ _ Never
_ _ When Device Restarts
X When Status Flags Change

No other options are permitted.
(see Note 3)</td></tr>
<tr><td>Default Counter Object/Variation:
_ _ No Counters Reported
_ _ Configurable (explain)
X Default Object - 20
_ _ Default Variation - 5
_ _ Point-by-point list attached</td><td>Counters Roll Over at:
_ _ No Counters Reported
_ _ Configurable (explain)
_ _ 16 Bits
X 32 Bits
_ _ Other Value _ _ _ _ _ _ _ _ _ _
_ _ Point-by-point list attached</td></tr>
<tr><td colspan="2">Sends Multi-Fragment Responses (Slave Only): X Yes _ _ No</td></tr>
</table>

Note 1: Timeouts While Waiting for Confirmations

For an unsolicited response when an application layer response confirmation is requested, the switch control waits before sending another response/confirmation attempt (if the retry number has not been reached) or stopping the **Confirmation** process.

Set the **Time Delay Between Retries** function with the setup software or via SCADA. See S&C Instruction Sheet 1045M-530, "6801M Automatic Switch Operators: *Setup*," for more information.

Note 2: Control Operations Executed

For all **Binary Output Relay (g12)** operations and **Analog Output (g41)** operations, the supported application layer function codess are:

- **Select (3)**
- **Operate (4)**
- **Direct Operate (5)**
- **Direct Operate No Ack (6)**

The control codes supported for **Binary Output Command** operations are:

Control Code	TCC Field	Op Type Field
0x01	NUL	PULSE_ON
0x03	NUL	LATCH_ON
0x04	NUL	LATCH_OFF
0x41	CLOSE	PULSE_ON
0x81	TRIP	PULSE_ON

For **Binary Output Command** operations, set the **Count** value to "1," **Queue** and **Clear** fields to "0," and **On-Time** and **Off-Time** fields to any valid values. The control will ignore the **On-Time** and **Off-Time** fields in the request. For the **Select** and **Operate** command sequence, the value of the **On-Time** and **Off-Time** fields must match between **Select** and **Operate** requests otherwise the command will not be executed.

For a **Binary Output Command** requests with the **Clear** field set to "1," the control will return a status code 4 [NOT_SUPPORTED] in its response and the operation will not be executed.

For more details on **Binary Output Command** operations, see the "Control Relay Output Block" section in the Object library section of "IEEE std 1815TM-2012."

Note 3: Unsolicited Responses

The switch operator returns unsolicited responses to the configured master station address when a change occurs in any mapped status point or when the device is restarted. The data returned is Object 2, Variation 2 (Binary Input Change with Time).

Enable and disable unsolicited responses from the setup software or via SCADA (Function Code 20 to enable, Function Code 21 to disable).

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; otherwise, the switch operator flags an error. All application layer responses use the standard response Function Code 129.

Table 8. Implementation

OBJECT			REQUEST		RESPONSE
Obj	Var	Description	Func Code (dec)	Qualifier Codes (hex)	Default Var. (hex)
1	0	Binary Input - All Variations	1	06	
1	1	Binary Input			00
2	0	Binary Input Change - All Variations	1	06,07,08	
2	1	Binary Input Change without Time	1	06,07,08	17
2	2	Binary Input Change with Time (see Note 4)	1	06,07,08	17
2	3	Binary Input Change with Relative Time (object parsed but no data to return)	1	06,07,08	17
10	0	Binary Output - All Variations	1	06	
10	2	Binary Output Status (See Note 5)		00,01,06	00,01
12	1	Control Relay Output Block	3,4, 5,6	17,28	echo of request
20	0	Binary Counter - All Variations	1,7, 8,9,10	06	
20	5	32-Bit Binary Counter without Flag			00
21	0	Frozen Counter - All Variations	1	06	
21	9	32-Bit Frozen Counter without Flag			00

TABLE CONTINUED ►

Table 8. Implementation—Continued

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	
22	1	Counter Event - 32-bit with flag (Note 4)		06,07,08	17
22	5	Counter Event - 32-bit		06,07,08	17
30	0	Analog Input - All Variations	1	06	
30	4	16-Bit Analog Input without Flag			00
32	0	Analog Change Event - All Variations (object parsed but no data to return)	1	06,07,08	
32	2	Analog Input Event - 16-bit without time (Note 4)		06,07,08	17
32	4	Analog Input Event - 16-bit with time		06,07,08	17
40	0	Analog Output Status - All Variations	1	06	
40	2	16-Bit Analog Output Status			00
41	2	16-Bit Analog Output Block	3,4, 5,6	17,28	echo of request
50	1	Time and Date - Absolute Time	2	07 limited quantity = 1	IINs only
50	3	Time and Date - Absolute time at last recorded time	2	07 limited quantity = 1	IINs only

TABLE CONTINUED ►

Table 8. Implementation—Continued

OBJECT			REQUEST		RESPONSE
Obj	Var	Description	Func Code (dec)	Qualifier Codes (hex)	Default Var. (hex)
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	IINs only
102	0	8-Bit Unsigned Integer (see Note 6)	1	04	04
102	1	8-Bit Unsigned Integer (see Note 6)	1,2	03,04,05	04
No Object			13		
No Object			23		
No Object			24		

Note 4: Change Event Objects

This is the default object returned in the unsolicited report by exception (if enabled) and the default object for any event data request.

Note 5: Binary Output Status

In a response to a **Binary Output** status request, the switch operator returns a status byte for each control point available. In this implementation of the **Binary Output Status** object, only the **Online** bit is used. All other bits, including the **State** bit, should be ignored.

The state of all digital points (controlled and not controlled) can be inspected by using the **Binary Input** object.

Note 6: Polling Class

DNP points are assigned to polling classes. S&C Automatic Switch Controls implement Class 0 for static data and Classes 1, 2, and 3 for event data. The Class 0 poll response contains all DNP points that have been assigned to Classes 0, 1, 2 or 3 and their most recent static value. The Class 1, 2 or 3 polls return event data, any DNP point whose value has changed since the last event response message was transmitted. Polling frequency is an aspect of the user's SCADA system and is user selectable.

The DNP Point Mapping is user-configurable, and all points do not need to be mapped. DNP points can be customer-assigned to any of the DNP Event Classes 1, 2, and 3.