

**MODELS RTS-AT, RTS-ABL, AND RTS-ABO  
AUTOMATIC TRANSFER SWITCH**

**FLEXLOGIC & COMMUNICATIONS  
MANUAL  
REV. 0**

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## SECTION 1 – ABOUT THIS OPERATION AND MAINTENANCE MANUAL

### 1.1 GENERAL

- 1.1.1 The information in this manual is subject to change. This manual is believed to be complete and accurate at the time of publication and no responsibility is assumed for any errors that may appear. In no event shall Russelectric Inc. be liable for incidental or consequential damages in connection with or arising from the use of the manual and its accompanying related materials.

### 1.2 MANUFACTURER INFORMATION

- 1.2.1 Manufactured by:  
**RUSSELECTRIC INC.**  
South Shore Park, Hingham, MA 02043-4387  
(781) 749-6000.
- 1.2.2 Field Service Information: If a problem arises with your system, please contact a Russelectric field service representative at (781) 749-6000 or the 24 hour emergency number 800-654-3020, or contact Russelectric by Fax at (781) 749-8077.

### 1.3 APPLICABILITY

- 1.3.1 This manual is applicable to the RTS-AT Automatic Transfer Switch, the RTS-ABO Overlap Bypass/Isolation Transfer Switch and the RTS-ABL Loadbreak Bypass/Isolation Transfer Switch product lines.
- 1.3.2 This document supplements the Operation and Maintenance Manuals and the Installation Manuals for this product line. The User must be familiar with the contents of both manuals for the appropriate product before utilizing the information contained within this document.

### 1.4 SAFETY

- 1.4.1 Read these instructions carefully and look at the equipment to become familiar with the equipment before trying to install, operate, service or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

#### 1.4.2 Safety Symbols And Hazard Categories

##### 1.4.2.1



The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

##### 1.4.2.2



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

##### 1.4.2.3





**DANGER** indicates an imminently hazardous situation which, if not avoided, **will result in** death or serious injury.

1.4.2.4



**WARNING** indicates a potentially hazardous situation which, if not avoided, **can result in** death or serious injury.

- 1.4.2.5  **CAUTION** used with the safety symbol indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate injury.
- 1.4.2.6  **CAUTION** used **without** the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, **can result in** property damage.
- 1.4.2.7 When working around cubicles, observe the following guidelines:
- 1.4.2.7.1 Be careful when opening and entering cubicles. Dangerous Voltages may exist on the interior sections.
  - 1.4.2.7.2 Keep all unattended cubicle sections closed and locked.
  - 1.4.2.7.3 Restrict all non-authorized individuals from exposed interior ATS areas.
  - 1.4.2.7.4 Ensure that the “S1” (also called “preferred” or “normal” and the “S2” (also called “non-preferred” or “emergency”) sources are shutdown when servicing or cleaning ATS interiors.
- 1.4.2.8 **NOTE:** Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Russelectric Inc. for any consequences arising out of the use of this material.

## 1.5 FOREWORD

- 1.5.1 This manual is a guide to programming the Flexlogic Control System and communicating with the RTS-AT, RTS-ABO and RTS-ABL Transfer Switch lines, all with the Model RTPCS programmable transfer control and monitoring system.

## 1.6 FLEXLOGIC AND COMMUNICATIONS MANUAL ORGANIZATION

- 1.6.1 This manual is broken up into 3 sections, summarized below:
- 1.6.1.1 **Section 1** summarizes the organization of this Manual.
  - 1.6.1.2 **Section 2** covers remote programming via the RTPCS FlexLogic™ system, defining the operators and listing the operands.
  - 1.6.1.3 **Section 3** covers details for communicating with the control system both through a Modbus RTU protocol via RS485 connection, and through a Modbus TCP/IP protocol via 10/100 Base-T Ethernet. The section provides information on the commands, the Modbus/hexadecimal memory locations for each control and data point, and the required format for each point.

## SECTION 2 – RPTCS FLEXLOGIC PROGRAMMING

### 2.1 GENERAL

- 2.1.1 This chapter describes the RPTCS FlexLogic™ system, defines its operators, and lists its operands.
- 2.1.2 All RPTCS digital signal states are represented by FlexLogic™ operands. Each operand is in one of two states: on (asserted, logic 1, or set), or off (de-asserted, logic 0, or reset). There is a FlexLogic™ operand for each contact input, contact output, communications command, control panel command, element trip, and element alarm, as well as many others.
- 2.1.3 A list of FlexLogic™ operands and operators are sequentially processed once every 50 ms. When list processing encounters an operand, the value of that operand is placed in a first-in-first out stack. When list processing encounters a calculation operator, the number of values required for the calculation are removed from the stack, and the result of the operation is placed back on the stack. The operators are logic gates (for example, AND, OR, NOT), timers, latches, one-shots, and assignments. Assignment operators assign the value calculated by the preceding operators to a special class of operands called virtual outputs. Like any other operand, a virtual output can be used as an input to any operator – feedback to achieve seal-in is allowed. When list processing encounters an end operator, processing is stopped until the next processing cycle, at which time it restarts at the top of the list.
- 2.1.4 Each contact output has a setpoint to specify the operand that drives the output. Any operand may be selected – selection of a virtual output is the means by which FlexLogic™ directly controls external equipment such as the motor contactors.
- 2.1.5 The operators used in FlexLogic™ conform to the following rules.
  - 2.1.5.1 A virtual output may only be assigned once within any given ATS. An unassigned virtual output will have a value of off.
  - 2.1.5.2 A maximum of thirty (30) general purpose timers (timers 1 through 30) are allowed.
  - 2.1.5.3 Each timer may only be used once within any given ATS.
  - 2.1.5.4 A maximum of thirty (30) one-shots are allowed.
  - 2.1.5.5 512 lines are executed during every 50 ms.

2.1.6 The operators available in FlexLogic™ are shown in Table 2.1.6 below.

Table 2.1.6 Flexlogic Operators

<b><u>Operator</u></b>	<b><u>Inputs</u></b>	<b><u>Description</u></b>
<operand>	none	The output value is the value of the named <operand>.
NOT	1	The output value is “on” if and only if the input value is “off”.
OR	2 to 16	The output value is “on” if and only if any of the input values are “on”.
AND	2 to 16	The output value is “on” if and only if all of the input values are “on”.
NOR	2 to 16	The output value is “on” if and only if all of the input values are “off”.
NAND	2 to 16	The output value is “on” if and only if any of the inputs values are “off”.
XOR	2	The output value is “on” if and only if one input value is “on” and the other input value is “off”.
TIMER	1	The output value is “on” if the input value has been “on” for the set pickup time. Once the output value is “on”, it remains “on” until the input value has been “off” for the set dropout time.
LATCH	2	The output value is the state of a reset-dominant volatile bi-stable latch, where the first input value is the set input, and the second input value is the reset input.
Positive one-shot	1	The output value is “on” for one processing cycle following an off-to-on transition of the input value.
Negative one-shot	1	The output value is “on” for one processing cycle following an on-to-off transition of the input value.-
Dual one-shot	1	The output value is “on” for one processing cycle following either an on-to-off or off-to-on transition of the input value..
ASSIGN <operand>	1	The input value is assigned to the named operand. There is otherwise no output value.
END	none	The first END encountered terminates the current processing cycle.

2.1.7 The FlexLogic™ operands available in the RPTCS are listed in Table 2.1.7 below.

Table 2.1.7 Flexlogic Operands

<b>OPERAND</b>	<b>DESCRIPTION</b>
<b>Control operands: auto/manual</b>	
Access Switch Closed	Asserted when the corresponding Access Switch input is active.
Load Control 1	Asserted when the Load Control 1 output is active.
Load Control 2	Asserted when the Load Control 2 output is active.
Load Control 3	Asserted when the Load Control 3 output is active.
Load Control 4	Asserted when the Load Control 4 output is active.
Load Control 5	Asserted when the Load Control 5 output is active.
Load Control 6	Asserted when the Load Control 6 output is active.
Remote Timer Bypass	Asserted when one or more of the corresponding Bypass Xfer Time Delay to S1 or Bypass Xfer Time Delay to S2 inputs are active, or when either one or both of the equivalent communications signals has been received.
<b>Any Alarm</b>	
Bypass ATS on S1	Asserted when the corresponding AB4 input is active.
Bypass ATS on S2	Asserted when the corresponding AB3 input is active.
Process Interlock A Alarm	Asserted when customer configurable interlock A is active.
Process Interlock B Alarm	Asserted when customer configurable interlock B is active.
Process Interlock C Alarm	Asserted when customer configurable interlock C is active.
Process Interlock D Alarm	Asserted when customer configurable interlock D is active.
Process Interlock E Alarm	Asserted when customer configurable interlock E is active.
Process Interlock F Alarm	Asserted when customer configurable interlock F is active.
Process Interlock G Alarm	Asserted when customer configurable interlock G is active.
Process Interlock H Alarm	Asserted when customer configurable interlock H is active.
Process Interlock I Alarm	Asserted when customer configurable interlock I is active.
Process Interlock J Alarm	Asserted when customer configurable interlock J is active.
<b>Fixed operands</b>	
Off	The operand is always off (not asserted). This may be used as a placeholder or test value.
On	The operand is always on (asserted). This may be used as a placeholder or test value.
<b>Security operands</b>	
Level 1 Access	Asserted when level 1 security rights are in effect.
Level 2 Access	Asserted when level 2 security rights are in effect.
Level 3 Access	Asserted when level 3 security rights are in effect.
<b>System trouble operands</b>	
Self-Test Alarm	Asserted when the self-test has failed and is set for alarm.

2.1.8 **Example:** Assigning an AB3 position contact to a user-configurable output:

2.1.8.1 To create an additional AB3 relay, the user can go into the FlexLogic editor of the Multilin PC Setup software.

2.1.8.2 The first entry entails selecting a Contact Input from the dropdown list as type, and then select Contact Input G10 (Cont IP (8) G10) under 'syntax'. The second entry involves assigning this input to a virtual output. To do so, select 'Assign Virtual Output' as 'type' and select, e.g., '= Virtual Op 1 (VO1)' as 'syntax'

2.1.8.3 The picture below (Figure 2.1.8.3) illustrates these assignments



<div> <div>Save</div> <div>Restore</div> <div>Default</div> </div>		
FLEXLOGIC ENTRY	TYPE	SYNTAX
View Graphic	View	View
FlexLogic Entry 1	Contact Input	Cont Ip 8 (G10)
FlexLogic Entry 2	Assign Virtual Output	= Virtual Op 1 (VO1)
FlexLogic Entry 3	End of List	

Figure 2.1.8.3 FlexLogic Entry

- 2.1.8.4 This virtual output can now be assigned to a real output from the setpoints/configure/outputs screen. For example, the picture below (Figure 2.1.8.4) shows how this virtual output is assigned to Contact Output 7 on terminal G2.

<div> <div>Save</div> <div>Restore</div> <div>Default</div> </div>	
SETTING	PARAMETER
Contact Output 7 (G2)	Virtual Output 1
Contact Output 8 (G3)	N/A
Contact Output 9 (G4)	N/A
Contact Output 10 (G5)	N/A

Figure 2.1.8.4 Real Output Assignment from Virtual Output

## SECTION 3 – RPTCS COMMUNICATIONS

### 3.1 COMMUNICATIONS INTERFACES

3.1.1 The RPTCS supports two communications interfaces:

3.1.1.1 Modbus RTU via RS485

3.1.1.2 Modbus TCP/IP via 10/100Base-T Ethernet

3.1.2 In addition, a USB interface is provided on the front of the interface panel. It is configured to be used in conjunction with a virtual serial port on a Windows-based PC.

3.1.3 **NOTE** Setpoint changes related to communication parameters require a power cycle of the controller to be activated.

### 3.2 RS485 INTERFACE (MODBUS RTU)

#### 3.2.1 General

3.2.1.1 The RS485 interface is a serial two-wire port intended for use as a Modbus RTU slave. The RS485 port has the following characteristics.

3.2.1.1.1 Address: 1 to 254, default 254

3.2.1.1.2 Baud rate: 9600 to 115200 bps, default 115200

3.2.1.1.3 Parity: None

3.2.1.1.4 Data bits: 8

3.2.1.1.5 Stop bits: 1

3.2.1.1.6 Supported Modbus function codes: 1, 3, 4, 5, 6, 7, 8, 16

#### 3.2.2 Modbus Protocol

##### 3.2.2.1 General

3.2.2.1.1 The RPTCS implements a subset of the Modicon Modbus RTU serial communication standard. The Modbus protocol is hardware-independent. That is, the physical layer can be any of a variety of standard hardware configurations. This includes RS232, RS422, RS485, fiber optics, etc. Modbus is a single master / multiple slave type of protocol suitable for a multi-drop configuration as provided by RS485 hardware. The RPTCS Modbus implementation employs two-wire RS485 hardware. Using RS485, up to 32 RPTCSs can be daisy-chained together on a single communication channel.

3.2.2.1.2 The RPTCS is always a Modbus slave. It can not be programmed as a Modbus master. Computers or PLCs are commonly programmed as masters.

- 3.2.2.1.3 Both monitoring and control are possible using read and write register commands. Other commands are supported to provide additional functions.

### 3.2.2.2 Electrical Interface

- 3.2.2.2.1 The hardware or electrical interface in the RPTCS is two-wire RS485. In a two-wire link, data is transmitted and received over the same two wires. Although RS485 two-wire communication is bi-directional, the data is never transmitted and received at the same time. This means that the data flow is half duplex.
- 3.2.2.2.2 RS485 lines should be connected in a daisy-chain configuration with terminating networks installed at each end of the link (i.e. at the master end and at the slave farthest from the master). The terminating network should consist of a 120  $\Omega$  resistor in series with a 1 nF ceramic capacitor when used with Belden 9841 RS485 wire. Shielded wire should always be used to minimize noise. The shield should be connected to all of the RPTCSs as well as the master, then grounded at one location only. This keeps the ground potential at the same level for all of the devices on the serial link.
- 3.2.2.2.3 **NOTE:** Polarity is important in RS485 communications. The '+' (positive) terminals of every device must be connected together.

### 3.2.2.3 Data Frame Format and Data Rate

- 3.2.2.3.1 One data frame of an asynchronous transmission to or from a RPTCS typically consists of 1 start bit, 8 data bits, and 1 stop bit. This produces a 10 bit data frame. This is important for transmission through modems at high bit rates (11 bit data frames are not supported by Hayes modems at bit rates of greater than 300 bps).
- 3.2.2.3.2 Modbus protocol can be implemented at any standard communication speed. The RPTCS supports operation at 9600, 19200, 38400, 57600, and 115200 baud.

### 3.2.2.4 Data Packet Format

- 3.2.2.4.1 A complete request/response sequence consists of the following bytes (transmitted as separate data frames):
  - 3.2.2.4.1.1 Master Request Transmission:
    - 3.2.2.4.1.1.1 SLAVE ADDRESS: 1 byte
    - 3.2.2.4.1.1.2 FUNCTION CODE: 1 byte
    - 3.2.2.4.1.1.3 DATA: variable number of bytes depending on FUNCTION CODE
    - 3.2.2.4.1.1.4 CRC: 2 bytes
  - 3.2.2.4.1.2 Slave Response Transmission:
    - 3.2.2.4.1.2.1 SLAVE ADDRESS: 1 byte
    - 3.2.2.4.1.2.2 FUNCTION CODE: 1 byte
    - 3.2.2.4.1.2.3 CRC: 2 bytes

- 3.2.2.4.1.3 **SLAVE ADDRESS:** This is the first byte of every transmission. This byte represents the user-assigned address of the slave device that is to receive the message sent by the master. Each slave device must be assigned a unique address and only the addressed slave will respond to a transmission that starts with its address. In a master request transmission the SLAVE ADDRESS represents the address of the slave to which the request is being sent. In a slave response transmission the SLAVE ADDRESS represents the address of the slave that is sending the response.
- 3.2.2.4.1.4 **FUNCTION CODE:** This is the second byte of every transmission. Modbus defines function codes of 1 to 127.
- 3.2.2.4.1.5 **DATA:** This will be a variable number of bytes depending on the FUNCTION CODE. This may be Actual Values, Setpoints, or addresses sent by the master to the slave or by the slave to the master.
- 3.2.2.4.1.6 **CRC:** This is a two byte error checking code.

### 3.2.2.5 Error Checking

- 3.2.2.5.1 The RTU version of Modbus includes a two-byte CRC-16 (16 bit cyclic redundancy check) with every transmission. The CRC-16 algorithm essentially treats the entire data stream (data bits only; start, stop and parity ignored) as one continuous binary number. This number is first shifted left 16 bits and then divided by a characteristic polynomial (11000000000000101B). The 16 bit remainder of the division is appended to the end of the transmission, MSByte first. The resulting message including CRC, when divided by the same polynomial at the receiver will give a zero remainder if no transmission errors have occurred.
- 3.2.2.5.2 If a RPTCS Modbus slave device receives a transmission in which an error is indicated by the CRC-16 calculation, the slave device will not respond to the transmission. A CRC-16 error indicates that one or more bytes of the transmission were received incorrectly and thus the entire transmission should be ignored in order to avoid the RPTCS performing any incorrect operation.
- 3.2.2.5.3 The CRC-16 calculation is an industry standard method used for error detection. An algorithm is included here to assist programmers in situations where no standard CRC-16 calculation routines are available.

### 3.2.2.6 CRC-16 Algorithm

- 3.2.2.6.1 Once the following algorithm is complete, the working register "A" will contain the CRC value to be transmitted. Note that this algorithm requires the characteristic polynomial to be reverse bit ordered. The MSBit of the characteristic polynomial is dropped since it does not affect the value of the remainder. Table 3.2.2.6.1 lists the symbols are used in the algorithm:

Table 3.2.2.6.1 Algorithm Symbols

<b>SYMBOL</b>	<b>MEANING</b>
—>	Data transfer
A	16 bit working register
AL	Low order byte of A
AH	High order byte of A
CRC	16 bit CRC-16 value
i, j	Loop counters
(+)	Logical exclusive or operator
Di	i-th data byte (i = 0 to n-1)
G	16 bit characteristic polynomial = 1010000000000001 with MSbit dropped and bit order reversed
shr(x)	Shift right (the LSbit of the low order byte of x shifts into a carry flag, a '0' is shifted into the MSbit of the high order byte of x, all other bits shift right one location

3.2.2.6.2 The algorithm is shown in table 3.2.2.6.2:

Table 3.2.2.6.2 CRC-16 Algorithm

1	FFFF hex —> A
2	0 —> i
3	0 —> j
4	Di (+) AL —> AL
5	.j+1 —> j
6	shr(A)
7	Is there a carry? <b>No:</b> go to 8 <b>Yes:</b> G (+) A —> A
8	Is j = 8? <b>No:</b> go to 5 <b>Yes:</b> go to 9.
9	i+1 —> i
10	is i = N? <b>No:</b> go to 3 <b>Yes:</b> go to 11.
11	A —> CRC

### 3.2.2.7 Timing

- 3.2.2.7.1 Data packet synchronization is maintained by timing constraints. The receiving device must measure the time between the reception of characters. If 3.5 character times elapse without a new character or completion of the packet, then the communication link must be reset (i.e. all slaves start listening for a new transmission from the master). Thus at 9600 baud a delay of greater than  $3.5 \times 1 / 9600 \times 10 \times 10^{-3} = 3.65 \times 10^{-3}$  ms will cause the communication link to be reset.

## 3.2.2.8 RPTCS Supported Functions

3.2.2.8.1 The following functions are supported by the RPTCS:

- 3.2.2.8.1.1 FUNCTION CODE 01 - Read Input Status
- 3.2.2.8.1.2 FUNCTION CODE 03 - Read Setpoints and Actual Values
- 3.2.2.8.1.3 FUNCTION CODE 04 - Read Setpoints and Actual Values
- 3.2.2.8.1.4 FUNCTION CODE 05 - Execute Operation
- 3.2.2.8.1.5 FUNCTION CODE 06 - Store Single Setpoint
- 3.2.2.8.1.6 FUNCTION CODE 07 - Read Device Status
- 3.2.2.8.1.7 FUNCTION CODE 08 - Loopback Test
- 3.2.2.8.1.8 FUNCTION CODE 10 - Store Multiple Setpoints

## 3.2.3 Modbus Functions

## 3.2.3.1 Function Code 01H

3.2.3.1.1 **Modbus implementation:** Read Input Status

3.2.3.1.2 **RPTCS implementation:** Read Net Control Status

3.2.3.1.3 This function code is supported for a selective range of commands for RPTCS for net control functionality. This function reads the ON/OFF status for each net control command. The query message specifies the starting command and number of commands status to be read. Commands are addressed starting at zero.

3.2.3.1.4 The master/slave packets have the format shown in Table 3.2.3.1.4:

Table 3.2.3.1.4 Master/Slave Packet Format For Function 01H

<b><u>MASTER TRANSMISSION</u></b>	<b><u>BYTES</u></b>	<b><u>EXAMPLE</u></b>	<b><u>DESCRIPTION</u></b>
Slave Address	1	11	Message for Slave 17
Function Code	1	02	Read Net Control Status
Starting Address	2	00 C4	Starting Command Address
Number of Points	2	00 02	Number of Status Bits
CRC	1	-----	CRC Error Code
<b><u>SLAVE RESPONSE</u></b>	<b><u>BYTES</u></b>	<b><u>EXAMPLE</u></b>	<b><u>DESCRIPTION</u></b>
Slave Address	1	11	Message from Slave 17
Function Code	1	02	Read Net Control Status
Byte Count	1	01	Number of Status Bytes
Data	1	1	Bytes of Net Control Status
CRC	1	----	CRC Error Code

3.2.3.1.5 Each returned data bit is an ON/OFF status. The number of returned data bytes will change according to the number of points requested.

3.2.3.1.6 Table 3.2.3.1.6 lists the supported command addresses for this function code:

Table 3.2.3.1.6 Command Addresses For Function Code 01H

<b><u>COMMAND NUMBER</u></b>	<b><u>DESCRIPTION</u></b>
196	Reset Time S2 Available Counter
197	Alarm Silence
198	Start Manual Xfer to S2
199	Start Manual Xfer to S1
200	Net Ctrl Test on No load
202	Regular Load Test Control
203	Auto/Manual retransfer to S1
204	Auto/Manual transfer to S1/S2
206	Net Ctrl Inhibit Transfer to S2
207	Net Ctrl Inhibit Transfer to S1
208	Net Ctrl Transition Mode Selector
209	Command to Bypass sources out-of-phase fault
210	Confirm Bypass sources out-of-phase fault
211	Cancel Bypass sources out-of-phase fault
212	Bypass Pending Exerciser
213	Cancel Exerciser Bypass
214	Net Ctrl Auto Transfer Inhibit
215	Net Ctrl Auto Transfer Relay
216	Net Ctrl Bypass Active ATS Timer
217	Net Ctrl Exerciser Cancel
218	Net Ctrl Generator Start
219	Net Ctrl Lockout Reset
220	Net Ctrl Load Shed for S2
221	Net Ctrl Prime Source Selection
222	Net Ctrl Test Mode Cancel
223	Net Ctrl Test On Load
224	Net Ctrl Transfer Commit

## 3.2.3.2 Function Code 03H

3.2.3.2.1 **Modbus implementation:** Read Holding Registers3.2.3.2.2 **RPTCS implementation:** Read Setpoints

3.2.3.2.3 For the RPTCS implementation of Modbus, this function code can be used to read any setpoints (“holding registers”). Holding registers are 16 bit (two byte) values transmitted high order byte first. Thus all RPTCS Setpoints are sent as two bytes. The maximum number of registers that can be read in one transmission is 125.

3.2.3.2.4 The slave response to this function code is the slave address, function code, a count of the number of data bytes to follow, the data itself and the CRC. Each data item is sent as a two byte number with the high order byte sent first.

3.2.3.2.5 For example, consider a request for slave 17 to respond with 3 registers starting at address 006B. For this example the register data in these addresses are as shown in Table 35.2.3.2.5:

Table 3.2.3.2.5 Example Register Data

<u>ADDRESS</u>	<u>DATA</u>
006B	022B
006C	0000
006D	0064

3.2.3.2.5.1 The master/slave packets have the format indicated in Table 3.2.3.2.5.1:

Table 3.2.3.2.5.1 Master/Slave Packet Format For Function Code 03H

<u>MASTER TRANSMISSION</u>	<u>BYTES</u>	<u>EXAMPLE</u>	<u>DESCRIPTION</u>
Slave Address	1	11	Message for Slave 17
Function Code	1	03	Read Registers
Data Starting Address	2	00 6B	Data Starting at 00 6B
Number of Setpoints	2	00 03	3 Registers = 6 Bytes Total
CRC	2	76 87	CRC Error Code
<u>SLAVE RESPONSE</u>	<u>BYTES</u>	<u>EXAMPLE</u>	<u>DESCRIPTION</u>
Slave Address	1	11	Message from Slave 17
Function Code	1	03	Read Net Control Status
Byte Count	1	06	3 Registers = 6 Bytes Total
Data 1 (See Definition Above)	2	02 2b	Value in Address 006B
Data 2 (See Definition Above)	2	00 00	Value in Address 006C
Data 3 (See Definition Above)	2	00 64	Value in Address 006D
CRC	2	54 83	CRC Error Code

### 3.2.3.3 Function Code 04H

3.2.3.3.1 **Modbus implementation:** Read Input Registers

3.2.3.3.2 **RPTCS implementation:** Read Actual Values

3.2.3.3.3 For the RPTCS implementation of Modbus, this function code can be used to read any actual values ("input registers"). Input registers are 16 bit (two byte) values transmitted high order byte first. Thus all RPTCS Actual Values are sent as two bytes. The maximum number of registers that can be read in one transmission is 125.

3.2.3.3.4 The slave response to this function code is the slave address, function code, a count of the data bytes to follow, the data itself and the CRC. Each data item is sent as a two byte number with the high order byte sent first.

3.2.3.3.5 For example, request slave 17 to respond with 1 register starting at address 0008. For this example the value in this register (0008) is 0000.

3.2.3.3.5.1 The master/slave packets have the format indicated in Table 3.2.3.3.5.1:



Table 3.2.3.3.5.1 Master/Slave Packet Format For Function Code 04H

<b><u>MASTER TRANSMISSION</u></b>	<b><u>BYTES</u></b>	<b><u>EXAMPLE</u></b>	<b><u>DESCRIPTION</u></b>
Slave Address	1	11	Message for Slave 17
Function Code	1	04	Read Registers
Data Starting Address	2	00 08	Data Starting at 00 08
Number of Actual Values	2	00 01	1 Register = 2 Bytes
CRC	2	B2 98	CRC Error Code
<b><u>SLAVE RESPONSE</u></b>	<b><u>BYTES</u></b>	<b><u>EXAMPLE</u></b>	<b><u>DESCRIPTION</u></b>
Slave Address	1	11	Message from Slave 17
Function Code	1	04	Read Registers
Byte Count	1	02	1 Register = 2 Bytes
Data (See Definition Above)	2	00 00	Value in Address 00 08
CRC	2	78 f3	CRC Error Code

## 3.2.3.4 Function Code 05H

3.2.3.4.1 **Modbus implementation:** Force Single Coil3.2.3.4.2 **RPTCS implementation:** Execute Operation

3.2.3.4.3 This function code allows the master to request a RPTCS to perform specific command operations.

3.2.3.4.4 For example, to request slave 17 to execute operation code 1 (reset), Table 3.2.3.4.4 shows the master/slave packet format:

Table 3.2.3.4.4 Master/Slave Packet Format For Function Code 05H

<b><u>MASTER TRANSMISSION</u></b>	<b><u>BYTES</u></b>	<b><u>EXAMPLE</u></b>	<b><u>DESCRIPTION</u></b>
Slave Address	1	11	Message for Slave 17
Function Code	1	05	Execute Operation
Operation Code	2	00 01	Operation Code 1
Code Value	2	FF 00	Perform Function
CRC	2	DF 6A	CRC Error Code
<b><u>SLAVE RESPONSE</u></b>	<b><u>BYTES</u></b>	<b><u>EXAMPLE</u></b>	<b><u>DESCRIPTION</u></b>
Slave Address	1	11	Message from Slave 17
Function Code	1	05	Execute Operation
Operation Code	2	00 01	Operation Code 1
Code Value	2	FF 00	Perform Function
CRC	2	DF 6A	CRC Error Code

3.2.3.4.4.1 The commands shown in Table 3.2.3.4.4.1, which can be performed by the RPTCS using function code 05, can also be initiated using function code 10H (see Para. 3.2.3.7):

Table 3.2.3.4.4.1 Function Code 05h Commands

<b><u>OPERATION CODE</u></b>	<b><u>DESCRIPTION</u></b>
1	Reset
97	Reset MWh and MVarh Meters
99	Clear Trip Counters
100	Clear Event Records
120	Trigger Waveform Capture
121	Start Datalog
122	Stop Datalog
130	LED Test
161	Reload Factory Setpoints 2
162	Reload Factory Setpoints 1
163	Restore to setpoint access only
181	RPTCS Test
183	RPTCS Test - Xfer Load
184	RPTCS Test - No Xfer
185	RPTCS Test - End
186	RPTCS Test - Cancel Exerciser Bypass
188	RPTCS Test - Cancel Bypass
189	RPTCS Message - Bypass
190	RPTCS Message - Yes
191	RPTCS Message - No
192	RPTCS Message - Escape
193	RPTCS Message - Cancel
194	RPTCS Message - Silence
195	195 RPTCS Message - Reset
<b>The following commands can only be performed using Function Code 05H:</b>	
196	Reset Time S2 Available Counter
197	Alarm Silence
198	Start Manual Xfer to S2
199	Start Manual Xfer to S1
200	Net Ctrl Test on No load
202	Regular Load Test Control
203	Auto/Manual retransfer to S1
204	Auto/Manual transfer to S1/S2
206	Net Ctrl Inhibit Transfer to S2
207	Net Ctrl Inhibit Transfer to S1
208	Net Ctrl Transition Mode Selector
209	Command to Bypass R50
210	Confirm Bypass R50
211	Cancel Bypass R50
223	Net Ctrl Test on Load
224	Net Ctrl Transfer Commit

## 3.2.3.5 Function Code 06H

3.2.3.5.1 **Modbus implementation:** Preset Single Register3.2.3.5.2 **RPTCS implementation:** Store Single Setpoint

3.2.3.5.3 This command allows the master to store a single setpoint into the memory of a RPTCS. The slave response to this function code is to echo the entire master transmission.

- 3.2.3.5.4 For example, request slave 17 to store the value 2 in setpoint address 04 5C. After the transmission in this example is complete, setpoints address 04 5C will contain the value 01F4. The master/slave packet format is shown in Table 3.2.3.5.4 below:

Table 3.2.3.5.4 Master/Slave Packet Format For Function Code 06H

<b><u>MASTER TRANSMISSION</u></b>	<b><u>BYTES</u></b>	<b><u>EXAMPLE</u></b>	<b><u>DESCRIPTION</u></b>
Slave Address	1	11	Message for Slave 17
Function Code	1	06	Store Single Setpoint
Data Starting Address	2	00 5C	Setpoint Address 04 5C
Data	2	00 02	Data for Setpoint 04 5C
CRC	2	CBB9	CRC Error Code
<b><u>SLAVE RESPONSE</u></b>	<b><u>BYTES</u></b>	<b><u>EXAMPLE</u></b>	<b><u>DESCRIPTION</u></b>
Slave Address	1	11	Message from Slave 17
Function Code	1	06	Store Single Setpoint
Data Starting Address	2	00 5C	Setpoint Address 04 5C
Data	2	00 02	Data for Setpoint 04 5C
CRC	2	CBB9	CRC Error Code

## 3.2.3.6 Function Code 08H

- 3.2.3.6.1 **Modbus implementation:** Loopback
- 3.2.3.6.2 **RPTCS implementation:** Loopback Test
- 3.2.3.6.3 This function is used to test the integrity of the communication link. The RPTCS will echo the request.
- 3.2.3.6.4 For example, consider a loopback test from slave 17, as shown in Table 3.2.3.6.4:

Table 3.2.3.6.4 Master/Slave Packet Format For Function Code 08H

<b><u>MASTER TRANSMISSION</u></b>	<b><u>BYTES</u></b>	<b><u>EXAMPLE</u></b>	<b><u>DESCRIPTION</u></b>
Slave Address	1	11	Message for Slave 17
Function Code	1	08	Loopback Test
Diag Code	2	00 00	Must be 00 00
Data	2	00 00	Must be 00 00
CRC	2	E0 0B	CRC Error Code
<b><u>SLAVE RESPONSE</u></b>	<b><u>BYTES</u></b>	<b><u>EXAMPLE</u></b>	<b><u>DESCRIPTION</u></b>
Slave Address	1	11	Message from Slave 17
Function Code	1	08	Loopback Test
Diag Code	2	00 00	Must be 00 00
Data	2	00 00	Must be 00 00
CRC	2	E0 0B	CRC Error Code

## 3.2.3.7 Function Code 010H

- 3.2.3.7.1 **Modbus implementation:** Reset Multiple Registers
- 3.2.3.7.2 **RPTCS implementation:** Store Multiple Setpoints

3.2.3.7.3 This function code allows multiple Setpoints to be stored into the RPTCS memory. Modbus “registers” are 16-bit (two byte) values transmitted high order byte first. Thus all RPTCS setpoints are sent as two bytes. The maximum number of Setpoints that can be stored in one transmission is dependent on the slave device. Modbus allows up to a maximum of 60 holding registers to be stored. The RPTCS response to this function code is to echo the slave address, function code, starting address, the number of Setpoints stored, and the CRC.

3.2.3.7.4 For example, consider a request for slave 17 to store the value 00 02 to setpoint address 04 5C and the value 01 F4 to setpoint address 04 5D. After the transmission in this example is complete, RPTCS slave 17 will have the setpoints information shown in Table 3.2.3.7.4 stored:

Table 3.2.3.7.4 Sample Setpoints

<b><u>ADDRESS</u></b>	<b><u>DATA</u></b>
04 5C	00 02
04 5D	01 F4

3.2.3.7.5 The master/slave packets have the format shown in Table 3.2.3.7.5:

Table 3.2.3.7.5 Master/Slave Packet Format For Function Code 10H

<b><u>MASTER TRANSMISSION</u></b>	<b><u>BYTES</u></b>	<b><u>EXAMPLE</u></b>	<b><u>DESCRIPTION</u></b>
Slave Address	1	11	Message for Slave 17
Function Code	1	10	Store Setpoints
Data Starting Address	2	04 5C	Setpoint Address 04 5C
Number of Setpoints	2	00 02	2 Setpoints = 4 Bytes Total
Byte Count	1	04	4 Bytes of Data
Data 1	2	00 02	Data for Setpoint Address 04 5C
Data 2	2	01 F4	Data for Setpoint Address 04 5D
CRC	2	31 11	CRC Error Code
<b><u>SLAVE RESPONSE</u></b>	<b><u>BYTES</u></b>	<b><u>EXAMPLE</u></b>	<b><u>DESCRIPTION</u></b>
Slave Address	1	11	Message from Slave 17
Function Code	1	10	Store Setpoints
Data Starting Address	2	04 5C	Setpoint Address 04 5C
Number of Setpoints	2	00 02	2 Setpoints
CRC	2	82 7A	CRC Error Code

### 3.2.3.8 Error Responses

3.2.3.8.1 When a RPTCS detects an error other than a CRC error, a response will be sent to the master. The MSBit of the FUNCTION CODE byte will be set to 1 (i.e. the function code sent from the slave will be equal to the function code sent from the master plus 128). The following byte will be an exception code indicating the type of error that occurred.

3.2.3.8.2 Transmissions received from the master with CRC errors will be ignored by the RPTCS.

3.2.3.8.3 The slave response to an error (other than CRC error) will be:

- 3.2.3.8.3.1 SLAVE ADDRESS: 1 byte
- 3.2.3.8.3.2 FUNCTION CODE: 1 byte (with MSbit set to 1)
- 3.2.3.8.3.3 EXCEPTION CODE: 1 byte
- 3.2.3.8.3.4 CRC: 2 bytes

3.2.3.8.4 The RPTCS implements the following exception response codes:

- 3.2.3.8.4.1 **01 - ILLEGAL FUNCTION:** The function code transmitted is not one of the functions supported by the RPTCS.
- 3.2.3.8.4.2 **02 - ILLEGAL DATA ADDRESS:** The address referenced in the data field transmitted by the master is not an allowable address for the RPTCS.
- 3.2.3.8.4.3 **03 - ILLEGAL DATA VALUE:** The value referenced in the data field transmitted by the master is not within range for the selected data address.

## 3.2.4 Performing commands using Function Code 10H

### 3.2.4.1 General

3.2.4.1.1 All commands other than net control commands can be performed using function code 16 as well as function code 5. When using FUNCTION CODE 16, the Command Function register must be written with a value of 5. The Command Operation register must be written with a valid command operation number. The Command Data registers must be written with valid data; this is dependent upon the command operation.

3.2.4.1.2 For example, consider a request for slave 17 to perform command operation 1 (RESET): The master/slave packets have the format shown in Table 3.2.4.1.2:

Table 3.2.4.1.2 Master/Slave Packet Format For Performing Commands

<b><u>MASTER TRANSMISSION</u></b>	<b><u>BYTES</u></b>	<b><u>EXAMPLE</u></b>	<b><u>DESCRIPTION</u></b>
Slave Address	1	11	Message for Slave 17
Function Code	1	10	Store Multiple Setpoints
Data Starting Address	2	00 80	Setpoint Address 00 80
Number of Setpoints	2	00 02	2 Setpoints = 4 Bytes Total
Byte Count	1	04	4 Bytes of Data
Data 1	2	00 05	Data for Setpoint Address 00 80
Data 2	2	00 01	Data for Setpoint Address 00 81
CRC	2	7E CE	CRC Error Code
<b><u>SLAVE RESPONSE</u></b>	<b><u>BYTES</u></b>	<b><u>EXAMPLE</u></b>	<b><u>DESCRIPTION</u></b>
Slave Address	1	11	Message from Slave 17
Function Code	1	10	Store Multiple Setpoints
Data Starting Address	2	00 80	Setpoint Address 00 80
Number of Setpoints	2	00 02	2 Setpoints
CRC	2	42 B0	CRC Error Code

### 3.2.4.2 Using the User Definable Memory Map

- 3.2.4.2.1 The RPTCS contains a User Definable area in the memory map. This area allows remapping of the addresses of any Actual Values or Setpoints registers. The User Definable area has two sections:
  - 3.2.4.2.1.1 A Register Index area (memory map addresses 020BH-0287H) that contains 125 Actual Values or Setpoints register addresses.
  - 3.2.4.2.1.2 A Register area (memory map addresses 020BH-0287H) that contains the data at the addresses in the Register Index.
- 3.2.4.2.2 Register data that is separated in the rest of the memory map may be re-mapped to adjacent register addresses in the User Definable Registers area. This is accomplished by writing to register addresses in the User Definable Register Index area. This allows for improved throughput of data and can eliminate the need for multiple read command sequences. The User Definable Register Index is stored as a setpoint and therefore it is “remembered” even when the power is removed.
- 3.2.4.2.3 For example, if the values of ATS STATUS (register address 013FH; Modbus address 30320) and EXERCISER STATUS (register address 0838H; Modbus address 32105) are required to be read from a RPTCS, their addresses may be re-mapped as follows:
  - 3.2.4.2.3.1 Write 30320 to address 020BH (40524) (User Definable Register Index 0000) using function code 06 or 16.
  - 3.2.4.2.3.2 Write 32105 to address 020CH (40525) (User Definable Register Index 0001) using function code 06 or 16.
- 3.2.4.2.4 The RPTCS PC software can be used to write these locations to the User Definable Register Index using the **Setpoints > Modbus Memory Map > User Map** screen.
- 3.2.4.2.5 It is now possible to read these two data registers with one read, at addresses 020BH, 020CH. Address 020BH will contain ATS STATUS. Address 020CH will contain EXERCISER STATUS.

## 3.2.5 Modbus Memory Map

### 3.2.5.1 General

- 3.2.5.1.1 Table 3.2.5.1.1 (39 pages) cross-references the Modbus and hexadecimal memory locations, descriptions and associated parameters for the RPTSC:
  - 3.2.5.1.1.1 **NOTE** Not all items are applicable to all switch types.

Table 3.2.5.1.1 Modbus Memory Map (Page 1 of 39 Pages)

<b>MODBUS</b>	<b>HEX</b>	<b>DESCRIPTION</b>	<b>MIN</b>	<b>MAX</b>	<b>STEP</b>	<b>UNITS</b>	<b>FORMAT</b>	<b>DEFAULT</b>	<b>SIZE IN WORDS</b>
<b>ACTUAL VALUES</b>									
<b>PRODUCT INFORMATION</b>									
30001	0000	Product Device Code	----	----	----	----	F22	N/A	1
30002	0001	Hardware Revision	----	----	----	----	F15	N/A	1
30003	0002	Firmware Version	----	----	----	----	F3	N/A	1
30004	0003	Display Software Version	----	----	----	----	F3	N/A	1
30005	0004	Modification Number	----	----	----	----	F1	N/A	1
30006	0005	Boot Version	----	----	----	----	F3	N/A	1
30007	0006	Boot Modification #	----	----	----	----	F1	N/A	1
30008	0007	Serial Number	----	----	----	----	F22	N/A	6
30014	000D	Order Code	----	----	----	----	F22	N/A	16
30030	001D	MAC Address	----	----	----	----	F22	N/A	6
30036	0023	Reserved	----	----	----	----	----	----	1
30037	0024	Build Date	----	----	----	----	F22	N/A	6
30043	002A	Build Time	----	----	----	----	F22	N/A	4
30047	002E	Original Calibration Date	----	----	----	----	F18	N/A	2
30049	0030	Last Calibration Date	----	----	----	----	F18	N/A	2
30051	0032	Communications Build Date	----	----	----	----	F22	N/A	6
30057	0038	Communications Build Time	----	----	----	----	F22	N/A	4
30061	003C	Communications Revision	----	----	----	----	F3	N/A	1
30062	003D	Platform Version	----	----	----	----	F3	N/A	1
30063	003E	Controller Model Number	----	----	----	----	FC407	----	1
30064	003F	Reserved	----	----	----	----	----	----	1
to	to	----	----	----	----	----	----	----	----
30185	00B8	Reserved	----	----	----	----	----	----	1
<b>LAST FAULT DATA</b>									
30186	00B9	Reserved	----	----	----	----	----	----	1
30187	00BA	Reserved	----	----	----	----	----	----	2
30189	00BC	Reserved	----	----	----	----	----	----	2
30191	00BE	Reserved	----	----	----	----	----	----	1
30192	00BF	Reserved	----	----	----	----	----	----	2
30194	00C1	Reserved	----	----	----	----	----	----	2
30196	00C3	Reserved	----	----	----	----	----	----	2
30198	00C5	Reserved	----	----	----	----	----	----	1
to	to	----	----	----	----	----	----	----	----
30201	00C8	Reserved	----	----	----	----	----	----	1
30202	00C9	Reserved	----	----	----	----	----	----	1
30203	00CA	Reserved	----	----	----	----	----	----	2
30205	00CC	Reserved	----	----	----	----	----	----	1
30206	00CD	Reserved	----	----	----	----	----	----	1
30207	00CE	Reserved	----	----	----	----	----	----	1
30208	00CF	Reserved	----	----	----	----	----	----	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 2 of 39 Pages)

MODBUS	HEX	DESCRIPTION	MIN	MAX	STEP	UNITS	FORMAT	DEFAULT	SIZE IN WORDS
30209	00D0	Reserved	-----	-----	-----	-----	-----	-----	1
30210	00D1	Reserved	-----	-----	-----	-----	-----	-----	1
30211	00D2	Reserved	-----	-----	-----	-----	-----	-----	1
30212	00D3	Reserved	-----	-----	-----	-----	-----	-----	2
30214	00D5	Reserved	-----	-----	-----	-----	-----	-----	2
30216	00D7	Reserved	-----	-----	-----	-----	-----	-----	1
30217	00D8	Reserved	-----	-----	-----	-----	-----	-----	1
30218	00D9	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
30222	00DD	Reserved	-----	-----	-----	-----	-----	-----	1
REAL-TIME CLOCK									
30223	00DE	Weekday	-----	-----	-----	-----	FC171	N/A	1
30224	00DF	Date Read Only	-----	-----	-----	-----	F18	N/A	2
30226	00E1	Time Read Only	-----	-----	-----	-----	F19	N/A	2
30228	00E3	Daylight Savings Active	-----	-----	-----	-----	FC126	N/A	1
30229	00E4	Reserved	-----	-----	-----	-----	-----	-----	1
30230	00E5	Total Number of Trips	-----	-----	-----	-----	F1	-----	1
30231	00E6	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
30282	0119	Reserved	-----	-----	-----	-----	-----	-----	1
CONTACT/VIRTUAL INPUTS/OUTPUTS STATUS									
30283	011A	Contact Input 64-33 (Bit Field)	-----	-----	-----	-----	FC168	-----	2
30285	011C	Contact Input 32-1 (Bit Field)	-----	-----	-----	-----	FC167	-----	2
30287	011E	Reserved	-----	-----	-----	-----	-----	-----	1
30288	011F	Virtual Input 32-1 1 (Bit Field)	-----	-----	-----	-----	FC167	-----	2
30290	0121	Virtual Output 32-1 (Bit Field)	-----	-----	-----	-----	FC167	-----	2
30292	0123	Reserved	-----	-----	-----	-----	-----	-----	2
to	to	-----	-----	-----	-----	-----	-----	-----	-----
30297	0128	Reserved	-----	-----	-----	-----	-----	-----	1
30298	0129	Contact Output 32-1 (Bit Field)	-----	-----	-----	-----	FC167	-----	2
30300	012B	Reserved	-----	-----	-----	-----	-----	-----	1
30301	012C	Reserved	-----	-----	-----	-----	-----	-----	1
SECURITY									
30302	012D	Current Security Access Level	-----	-----	-----	-----	FC167	N/A	1
30303 1	Reserved	Reserved	-----	-----	-----	-----	-----	-----	1
to	Reserved	-----	-----	-----	-----	-----	-----	-----	-----
30317	Reserved	Reserved	-----	-----	-----	-----	-----	-----	1
STATUS - ATS									
30318	013D	Source Status	-----	-----	-----	-----	FC158	-----	
30319	013E	Source 2 Status	-----	-----	-----	-----	FC158	-----	
30320	013F	ATS	-----	-----	-----	-----	FC315	-----	
30321	0140	Reserved	-----	-----	-----	-----	-----	-----	1
30322	0141	Reserved	-----	-----	-----	-----	-----	-----	1
NET CONTROL STATUS									
30323	0142	Net Control	-----	-----	-----	-----	FC312	-----	
30325	0144	Reserved	-----	-----	-----	-----	-----	-----	1



TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 3 of 39 Pages)

MODBUS	HEX	DESCRIPTION	MIN	MAX	STEP	UNITS	FORMAT	DEFAULT	SIZE IN WORDS
CURRENT METERING									
30326	0145	In	----	----	----	A	F10	N/A	2
30328	0147	Ia	----	----	----	A	F10	N/A	2
30330	0149	Ib	----	----	----	A	F10	N/A	2
30332	014B	Ic	----	----	----	A	F10	N/A	2
30334	014D	Iavg	----	----	----	A	F10	N/A	2
30336	014E	Reserved	----	----	----	----	----	N/A	1
30337	0150	Current Unbalance	----	----	----	%Ub	F1	N/A	1
30338	0151	In	----	----	----	A	F10	N/A	2
VOLTAGE METERING									
30340	0153	Va1 Angle	----	----	----	°	F1	N/A	1
30341	0154	Vb1 Angle	----	----	----	°	F1	N/A	1
30342	0155	Vc1 Angle	----	----	----	°	F1	N/A	1
30343	0156	Reserved	----	----	----	----	----	----	1
30344	0157	Reserved	----	----	----	----	----	----	1
30345	0158	Reserved	----	----	----	----	----	----	1
30346	0159	Va2 Angle	----	----	----	°	F1	N/A	1
30347	015A	Vb2 Angle	----	----	----	°	F1	N/A	1
30348	015B	Vc2 Angle	----	----	----	°	F1	N/A	1
30349	015C	Reserved	----	----	----	----	----	----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
30357	0164	Reserved	----	----	----	----	----	----	1
30358	0165	Vab	----	----	----	V	F1	N/A	1
30359	0166	Vbc	----	----	----	V	F1	N/A	1
30360	0167	Vca	----	----	----	V	F1	N/A	1
30361	0168	Average Line Voltage -	----	----	----	V	F1	N/A	1
30362	0169	Van	----	----	----	V	F1	N/A	1
30363	016A	Vbn	----	----	----	V	F1	N/A	1
30364	016B	Vcn	----	----	----	V	F1	N/A	1
30365	016C	Reserved	----	----	----	----	----	----	1
30366	016D	Freq	----	----	----	Hz	F3	N/A	1
30367	016E	Vab S2	----	----	----	V	F1	N/A	1
30368	016F	Vbc S2	----	----	----	V	F1	N/A	1
30369	0170	Vca S2	----	----	----	V	F1	N/A	1
30370	0171	Average Line Voltage S2	----	----	----	V	F1	N/A	1
30371	0172	Van S2	----	----	----	V	F1	N/A	1
30372	0173	Vbn S2	----	----	----	V	F1	N/A	1
30373	0174	Vcn S2	----	----	----	V	F1	N/A	1
30374	0175	Average Phase Voltage S2	----	----	----	V	F1	N/A	1
30375	0176	Freq S2	----	----	----	Hz	F3	N/A	1
30376	0177	Reserved	----	----	----	----	----	----	1
30377	0178	Voltage Imbalance S1	----	----	----	%Im	F1	N/A	1
30378	0179	Reserved	----	----	----	----	----	----	1
30379	017A	Voltage Imbalance S2	----	----	----	%Im	F1		1
30380	017B	Reserved	----	----	----	----	----	----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
30383	017E	Reserved	----	----	----	----	----	----	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 4 of 39 Pages)

<b>MODBUS</b>	<b>HEX</b>	<b>DESCRIPTION</b>	<b>MIN</b>	<b>MAX</b>	<b>STEP</b>	<b>UNITS</b>	<b>FORMAT</b>	<b>DEFAULT</b>	<b>SIZE IN WORDS</b>
<b>POWER METERING</b>									
30384	017F	Power Factor	----	----	----	----	F21	N/A	1
30385	0180	Real Power	----	----	----	kW	F13	N/A	2
30387	0182	Reserved	----	----	----	----	----	----	1
30388	0183	Reserved	----	----	----	----	----	----	1
30389	0184	Reactive Power	----	----	----	kVAr	F13	N/A	2
30391	0186	Apparent Power	----	----	----	kVA	F2	N/A	1
30392	0187	MWh Consumption	----	----	----	MWh	F17	N/A	2
30394	0189	MVArh Consumption	----	----	----	MVArh	F17	N/A	2
30396	018B	Reserved	----	----	----	----	----	----	2
30398	018D	Apparent Power	----	----	----	kVA	F10	N/A	2
30400	018F	Reserved	----	----	----	----	----	----	1
to	to	----	----	----	----	----	----	----	----
30504	01F7	Reserved	----	----	----	----	----	----	1
<b>LED STATUS FOR GRAPHICAL AND BASIC CONTROL PANEL</b>									
30505	01F8	LED Status	----	----	----	----	FC144	N/A	2
30507	01FA	Reserved	----	----	----	----	----	----	1
30508	01FB	Reserved	----	----	----	----	----	----	1
<b>GCP FACTORY TEST</b>									
30509	01FC	LCD Test Color	----	----	----	----	FC212	N/A	1
30510	01FD	Reserved	----	----	----	----	----	----	1
to	to	----	----	----	----	----	----	----	----
30523	020A	Reserved	----	----	----	----	----	----	1
<b>USER MAP VALUES</b>									
30524	020B	User Map Value 1	----	----	----	----	F1	N/A	1
30525	020C	User Map Value 2	----	----	----	----	F1	N/A	1
30526	020D	User Map Value 3	----	----	----	----	F1	N/A	1
30527	020E	User Map Value 4	----	----	----	----	F1	N/A	1
to	to	----	----	----	----	----	----	----	----
30645	0284	User Map Value 122	----	----	----	----	F1	N/A	1
30646	0285	User Map Value 123	----	----	----	----	F1	N/A	1
30647	0286	User Map Value 124	----	----	----	----	F1	N/A	1
30648	0287	User Map Value 125	----	----	----	----	F1	N/A	1
30649	0288	Reserved	----	----	----	----	----	----	
to	to	Reserved	----	----	----	----	----	----	
30656	028F	Reserved	----	----	----	----	----	----	
<b>SELF TEST</b>									
30657	0290	Internal Fault Cause	----	----	----	----	FC188	N/A	2

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 5 of 39 Pages)

MODBUS	HEX	DESCRIPTION	MIN	MAX	STEP	UNITS	FORMAT	DEFAULT	SIZE IN WORDS
EVENT RECORDER									
30659	0292	Event Recorder Last Reset 2 words	----	----	----	----	F18	N/A	2
30661	0294	Total Number of Events Since Last Clear	----	----	----	----	F1	N/A	1
30662	0295	Cause	----	----	----	----	FC134	N/A	1
30663	0296	Load On	----	----	----	----	FC302	N/A	1
30664	0297	Time	----	----	----	----	F19	N/A	2
30666	0299	Date	----	----	----	A	F18	N/A	2
30668	029B	Ia	----	----	----	A	F10	N/A	2
30670	029D	Ib	----	----	----	A	F10	N/A	2
30672	029F	Ic	----	----	----		F10	N/A	2
30674	02A1	In State	----	----	----	----	FC200	N/A	1
30675	02A2	Iimb	----	----	----	%	F1	N/A	1
30676	02A3	Ig	----	----	----	A	F10	N/A	2
30678	02A5	Vab	----	----	----	V	F1	N/A	1
30679	02A6	Vbc	----	----	----	V	F1	N/A	1
30680	02A7	Vca	----	----	----	V	F1	N/A	1
30681	02A8	Van	----	----	----	V	F1	N/A	1
30682	02A9	Vbn	----	----	----	V	F1	N/A	1
30683	02AA	Vcn	----	----	----	V	F1	N/A	1
30684	02AB	Freq	----	----	----	Hz	F3	N/A	1
30685	02AC	Power Factor	----	----	----	----	F21	N/A	1
30686	02AD	Real Power	----	----	----	kW	F13	N/A	2
30688	02AF	Reactive Power	----	----	----	kVAr	F13	N/A	2
30690	02B1	Apparent Power	----	----	----	kVA	F2	N/A	1
30691	02B2	Reserved	----	----	----	----	----	----	1
to	to	----	----	----	----	----	----	----	----
30709	02C4	Reserved	----	----	----	----	----	----	1
TRACE MEMORY									
30710	02C5	Trigger Date	----	----	----	----	F18	N/A	2
30712	02C7	Trigger Time	----	----	----	----	F19	N/A	2
30714	02C9	Trigger Cause	----	----	----	----	FC33	N/A	1
30715	02CA	Trigger Frequency	----	----	----	Hz	F3	N/A	1
30716	02CB	Total Triggers	----	----	----	----	F1	N/A	1
30717	02CC	Reserved	----	----	----	----	----	----	1
30718	02CD	Trigger Position	----	----	----	----	F1	N/A	1
30719	02CE	Trace Memory Start Index	----	----	----	----	F1	N/A	1
TRACE MEMORY SAMPLES									
30720	02CF	Sample Index + Trace Memory Sample 1	----	----	----	----	F4	N/A	1
30721	02D0	Sample Index + Trace Memory Sample 2	----	----	----	----	F4	N/A	1
to	to	----	----	----	----	----	----	----	----
30846	034D	Sample Index + Trace Memory Sample 127	----	----	----	----	F4	N/A	1
30847	034E	Sample Index + Trace Memory Sample 128	----	----	----	----	F4	N/A	1
30848	034F	Reserved	----	----	----	----	----	----	1
to	to	----	----	----	----	----	----	----	----
30859	035A	Reserved	----	----	----	----	----	----	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 6 of 39 Pages)

MODBUS	HEX	DESCRIPTION	MIN	MAX	STEP	UNITS	FORMAT	DEFAULT	SIZE IN WORDS
DATA LOG INFORMATION									
30860	035B	# of Triggers Since Clear	----	----	----	----	F4	N/A	1
30861	035C	# of Data Log Samples Stored	----	----	----	----	F4	N/A	1
30862	035D	Data Log Start Index	----	----	----	----	F4	N/A	1
30863	035E	Data Log Trigger Index	----	----	----	----	F4	N/A	1
30864	035F	Trigger Cause	----	----	----	----	FC133	N/A	1
30865	0360	Trigger Date	----	----	----	----	F18	N/A	2
30867	036A	Trigger Time	----	----	----	----	F19	N/A	2
30869	036B	Data Log Status	----	----	----	----	F75	N/A	1
30870	036C	Reserved	----	----	----	----	----	----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
30951	03B6	Reserved	----	----	----	----	----	----	1
STATUS BUFFER									
30952	03B7	Alarm Status 4	----	----	----	----	FC182	N/A	2
30954	03B9	Alarm Status 3	----	----	----	----	FC181	N/A	2
30956	03BB	Alarm Status 2	----	----	----	----	FC180	N/A	2
30958	03BD	Alarm Status 1	----	----	----	----	FC179	N/A	2
30960	03BF	Trip Status 4	----	----	----	----	FC186	N/A	2
30962	03C1	Trip Status 3	----	----	----	----	FC185	N/A	2
30964	03C3	Trip Status 2	----	----	----	----	FC184	N/A	2
30966	03C5	Trip Status 1	----	----	----	----	FC183	N/A	2
30968	03C7	Message Status 4	----	----	----	----	FC190	N/A	2
30970	03C9	Message Status 3	----	----	----	----	FC198	N/A	2
30972	03CB	Message Status 2	----	----	----	----	FC188	N/A	2
30974	03CD	Message Status 1	----	----	----	----	FC187	N/A	2
30976	03CF	Ctrl Element Status 4	----	----	----	----	FC194	N/A	2
30978	03D1	Ctrl Element Status 3	----	----	----	----	FC193	N/A	2
30980	03D3	Ctrl Element Status 2	----	----	----	----	FC192	N/A	2
30982	03D5	Ctrl Element Status 1	----	----	----	----	FC191	N/A	2
30984	03D7	Reserved	----	----	----	----	----	----	1
30985	03D8	Reserved	----	----	----	----	----	----	1
30986	03D9	Reserved	----	----	----	----	----	----	1
FLEXLOGIC									
30987	03DA	Element Flag	----	----	----	----	FC154	N/A	384
31371	055A	Program Status	----	----	----	----	FC109	N/A	
31372	055B	Flex Lines Used	----	----	----	----	F1	N/A	
31373	055C	Error Line	----	----	----	----	F1	N/A	
31374	055D	Reserved	----	----	----	----	----	----	
31375	055E	Reserved	----	----	----	----	----	----	
31376	055F	Reserved	----	----	----	----	----	----	
31377	0560	Reserved	----	----	----	----	----	----	
COMMUNICATION									
31378	0561	Serial Status	----	----	----	----	FC112	N/A	1
31379	0562	Ethernet Status	----	----	----	----	FC112	N/A	1
31380	0563	Reserved	----	----	----	----	----	----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
31395	0572	Reserved	----	----	----	----	----	----	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 7 of 39 Pages)

<u>MODBUS</u>	<u>HEX</u>	<u>DESCRIPTION</u>	<u>MIN</u>	<u>MAX</u>	<u>STEP</u>	<u>UNITS</u>	<u>FORMAT</u>	<u>DEFAULT</u>	<u>SIZE IN WORDS</u>
TOTAL HARMONIC DISTORTION									
31396	0573	Ia THD	----	----	----	%	F2	N/A	1
31397 1	0574	Ib THD	----	----	----	%	F2	N/A	1
31398	0575	Ic THD	----	----	----	%	F2	N/A	1
31399	0576	In THD	----	----	----	%	F2	N/A	1
31400	0577	Va THD	----	----	----	%	F2	N/A	1
31401	0578	Vb THD	----	----	----	%	F2	N/A	1
31402	0579	Vc THD	----	----	----	%	F2	N/A	1
31403	057A	S2 Va THD	----	----	----	%	F2	N/A	1
31404	057B	S2 Vb THD	----	----	----	%	F2	N/A	1
31405	057C	S2 Vc THD	----	----	----	%	F2	N/A	1
31406	057D	Reserved	----	----	----	----	----	----	----
to	to	----	----	----	----	----	----	----	----
31415	0586	Reserved	----	----	----	----	----	----	----
31416	0587	Avg I THD	----	----	----	%	F2	N/A	1
31417	0588	Avg V THD	----	----	----	%	F2	N/A	1
31418	0589	Avg S2 V THD	----	----	----	%	F2	N/A	1
31419	058A	Reserved	----	----	----	----	----	----	----
31420	058B	V1a 2nd Harm. Distortion	----	----	----	%	F2	N/A	1
31421	058C	V1a 3rd Harm. Distortion	----	----	----	%	F2	N/A	1
31422	058D	V1a 4th Harm. Distortion	----	----	----	%	F2	N/A	1
31423	058E	V1a 5th Harm. Distortion	----	----	----	%	F2	N/A	1
31424	058F	V1a 6th Harm. Distortion	----	----	----	%	F2	N/A	1
31425	0590	V1a 7th Harm. Distortion	----	----	----	%	F2	N/A	1
31426	0591	V1a 8th Harm. Distortion	----	----	----	%	F2	N/A	1
31427	0592	Reserved	----	----	----	----	----	----	----
to	to	----	----	----	----	----	----	----	----
31433	0598	Reserved	----	----	----	----	----	----	----
31434	0599	V1b 2nd Harm. Distortion	----	----	----	%	F2	N/A	1
31435	059A	V1b 3rd Harm. Distortion	----	----	----	%	F2	N/A	1
31436	059B	V1b 4th Harm. Distortion	----	----	----	%	F2	N/A	1
31437	059C	V1b 5th Harm. Distortion	----	----	----	%	F2	N/A	1
31438	058D	V1b 6th Harm. Distortion	----	----	----	%	F2	N/A	1
31439	059E	V1b 7th Harm. Distortion	----	----	----	%	F2	N/A	1
31440	059F	V1b 8th Harm. Distortion	----	----	----	%	F2	N/A	1
31441	05A0	Reserved	----	----	----	----	----	----	----
to	to	----	----	----	----	----	----	----	----
31447	05A6	Reserved	----	----	----	----	----	----	----
31448	05A7	V1c 2nd Harm. Distortion	----	----	----	%	F2	N/A	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 8 of 39 Pages)

<u>MODBUS</u>	<u>HEX</u>	<u>DESCRIPTION</u>	<u>MIN</u>	<u>MAX</u>	<u>STEP</u>	<u>UNITS</u>	<u>FORMAT</u>	<u>DEFAULT</u>	<u>SIZE IN WORDS</u>
TOTAL HARMONIC DISTORTION---CONT'D									
31449	05A8	V1c 3rd Harm. Distortion	----	----	----	%	F2	N/A	1
31450	05A9	V1c 4th Harm. Distortion	----	----	----	%	F2	N/A	1
31451	05AA	V1c 5th Harm. Distortion	----	----	----	%	F2	N/A	1
31452	05AB	V1c 6th Harm. Distortion	----	----	----	%	F2	N/A	1
31453	05AC	V1c 7th Harm. Distortion	----	----	----	%	F2	N/A	1
31454	05AD	V1c 8th Harm. Distortion	----	----	----	%	F2	N/A	1
31455	05AE	Reserved	----	----	----	----	----	----	
to	to	----	----	----	----	----	----	----	
31461	05B4	Reserved	----	----	----	----	----	----	
31462	05B5	V2a 2nd Harm. Distortion	----	----	----	%	F2	N/A	1
31463	05B6	V2a 3rd Harm. Distortion	----	----	----	%	F2	N/A	1
31464	05B7	V2a 4th Harm. Distortion	----	----	----	%	F2	N/A	1
31465	05B8	V2a 5th Harm. Distortion	----	----	----	%	F2	N/A	1
31466	05B9	V2a 6th Harm. Distortion	----	----	----	%	F2	N/A	1
31467	05BA	V2a 7th Harm. Distortion	----	----	----	%	F2	N/A	1
31468	05BB	V2a 8th Harm. Distortion	----	----	----	%	F2	N/A	1
31469	05BC	Reserved	----	----	----	----	----	----	
to	to	----	----	----	----	----	----	----	
31475	05C2	Reserved	----	----	----	----	----	----	
31476	05C3	V2b 2nd Harm. Distortion	----	----	----	%	F2	N/A	1
31477	05C4	V2b 3rd Harm. Distortion	----	----	----	%	F2	N/A	1
31478	05C5	V2b 4th Harm. Distortion	----	----	----	%	F2	N/A	1
31479	05C6	V2b 5th Harm. Distortion	----	----	----	%	F2	N/A	1
31480	05C7	V2b 6th Harm. Distortion	----	----	----	%	F2	N/A	1
31481	05C8	V2b 7th Harm. Distortion	----	----	----	%	F2	N/A	1
31482	05C9	V2b 8th Harm. Distortion	----	----	----	%	F2	N/A	1
31483	05CA	Reserved	----	----	----	----	----	----	
to	to	----	----	----	----	----	----	----	
31489	05D0	Reserved	----	----	----	----	----	----	
31490	05D1	V2c 2nd Harm. Distortion	----	----	----	%	F2	N/A	1
31491	05D2	V2c 3rd Harm. Distortion	----	----	----	%	F2	N/A	1
31492	05D3	V2c 4th Harm. Distortion	----	----	----	%	F2	N/A	1
31493	05D4	V2c 5th Harm. Distortion	----	----	----	%	F2	N/A	1
31494	05D5	V2c 6th Harm. Distortion	----	----	----	%	F2	N/A	1
31495	05D6	V2c 7th Harm. Distortion	----	----	----	%	F2	N/A	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 9 of 39 Pages)

<u>MODBUS</u>	<u>HEX</u>	<u>DESCRIPTION</u>	<u>MIN</u>	<u>MAX</u>	<u>STEP</u>	<u>UNITS</u>	<u>FORMAT</u>	<u>DEFAULT</u>	<u>SIZE IN WORDS</u>
TOTAL HARMONIC DISTORTION---CONT'D									
31496	05D7	V2c 8th Harm. Distortion	----	----	----	%	F2	N/A	1
31497	05D8	Reserved	----	----	----	----	----	----	
to	to	-----	-----	-----	-----	-----	-----	-----	
31503	05DE	Reserved	----	----	----	----	----	----	
31504	05DF	Ia 2nd Harm. Distortion	----	----	----	%	F2	N/A	1
31505	05E0	Ia 3rd Harm. Distortion	----	----	----	%	F2	N/A	1
31506	05E1	Ia 4th Harm. Distortion	----	----	----	%	F2	N/A	1
31507	05E2	Ia 5th Harm. Distortion	----	----	----	%	F2	N/A	1
31508	05E3	Ia 6th Harm. Distortion	----	----	----	%	F2	N/A	1
31509	05E4	Ia 7th Harm. Distortion	----	----	----	%	F2	N/A	1
31510	05E5	Ia 8th Harm. Distortion	----	----	----	%	F2	N/A	1
31511	05E6	Reserved	----	----	----	----	----	----	
to	to	-----	-----	-----	-----	-----	-----	-----	
31517	05EC	Reserved	----	----	----	----	----	----	
31518	05ED	Ib 2nd Harm. Distortion	----	----	----	%	F2	N/A	1
31519	05EE	Ib 3rd Harm. Distortion	----	----	----	%	F2	N/A	1
31520	05EF	Ib 4th Harm. Distortion	----	----	----	%	F2	N/A	1
31521	05F0	Ib 5th Harm. Distortion	----	----	----	%	F2	N/A	1
31522	05F1	Ib 6th Harm. Distortion	----	----	----	%	F2	N/A	1
31523	05F2	Ib 7th Harm. Distortion	----	----	----	%	F2	N/A	1
31524	05F3	Ib 8th Harm. Distortion	----	----	----	%	F2	N/A	1
31525	05F4	Reserved	----	----	----	----	----	----	
to	to	-----	-----	-----	-----	-----	-----	-----	
31531	05FA	Reserved	----	----	----	----	----	----	
31532	05FB	Ic 2nd Harm. Distortion	----	----	----	%	F2	N/A	1
31533	05FC	Ic 3rd Harm. Distortion	----	----	----	%	F2	N/A	1
31534	05FD	Ic 4th Harm. Distortion	----	----	----	%	F2	N/A	1
31535	05FE	Ic 5th Harm. Distortion	----	----	----	%	F2	N/A	1
31536	05FF	Ic 6th Harm. Distortion	----	----	----	%	F2	N/A	1
31537	0600	Ic 7th Harm. Distortion	----	----	----	%	F2	N/A	1
31538	0601	Ic 8th Harm. Distortion	----	----	----	%	F2	N/A	1
31539	0602	Reserved	----	----	----	----	----	----	
to	to	-----	-----	-----	-----	-----	-----	-----	
32036	07F3	Reserved	----	----	----	----	----	----	

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 10 of 39 Pages)

<b>MODBUS</b>	<b>HEX</b>	<b>DESCRIPTION</b>	<b>MIN</b>	<b>MAX</b>	<b>STEP</b>	<b>UNITS</b>	<b>FORMAT</b>	<b>DEFAULT</b>	<b>SIZE IN WORDS</b>
<b>ATS TRANSFER COUNTERS</b>									
32037	07F4	Reserved	----	----	----	----	----	----	1
32038	07F5	Reserved	----	----	----	----	----	----	1
32039	07F6 1	# of Xfers Open-S1 1	----	----	----	----	F1	N/A	1
32040	07F7	# of Xfers Open-S2	----	----	----	----	F1	N/A	1
32041	07F8	Reserved	----	----	----	----	----	----	1
32042	07F9	# of Xfers S1-Open	----	----	----	----	F1	N/A	1
32043	07FA	# of Xfers S1-S2	----	----	----	----	F1	N/A	1
32044	07FB	Reserved	----	----	----	----	----	----	1
32045	07FC	# of Xfers S2-Open	----	----	----	----	F1	N/A	1
32046	07FD	# of Xfers S2-S1	----	----	----	----	F1	N/A	1
32047	07FE	Xfer Time Open-S1 New	----	----	----	ms	F1	N/A	1
32048	07FF	Xfer Time Open-S1 Prev	----	----	----	ms	F1	N/A	1
32049	0800	Xfer Time Open-S2 New	----	----	----	ms	F1	N/A	1
32050	0801	Xfer Time Open-S2 Prev	----	----	----	ms	F1	N/A	1
32051	0802	Xfer Time S1-Open New	----	----	----	ms	F1	N/A	1
32052	0803	Xfer Time S1-Open Prev	----	----	----	ms	F1	N/A	1
32053	0804	Xfer Time S1-S2 New	----	----	----	ms	F1	N/A	1
32054	0805	Xfer Time S1-S2 Prev	----	----	----	ms	F1	N/A	1
32055	0806	Xfer Time S2-Open New	----	----	----	ms	F1	N/A	1
32056	0807	Xfer Time S2-Open Prev	----	----	----	ms	F1	N/A	1
32057	0808	Xfer Time S2-S1 New	----	----	----	ms	F1	N/A	1
32058	0809	Xfer Time S2-S1 Prev	----	----	----	ms	F1	N/A	1
32059	080A	Reserved	----	----	----	----	----	----	1
to	to	-----	----	----	----	----	----	----	----
32063	080E	Reserved	----	----	----	----	----	----	1
<b>REPORT</b>									
32064	080F	Last Transfer Reason	----	----	----	----	FC318	N/A	1
32065	0810	Last Transfer Sequence	----	----	----	----	FC198	N/A	1
32066	0811	Last Transfer Start Date	----	----	----	----	F19	N/A	2
32068	0813	Last Transfer Start Time	----	----	----	----	F19	N/A	2
32070	0815	Last Transfer Over Date	----	----	----	----	F18	N/A	2
32072	0817	Last Transfer Over Time	----	----	----	----	F19	N/A	2
32074	0819	Last Transfer To	----	----	----	----	FC199	N/A	1
32075	081A	Last Transfer From	----	----	----	----	FC199	N/A	1
32076	081B	Reserved	----	----	----	----	----	----	1
to	to	-----	----	----	----	----	----	----	----
32079	081E	Reserved	----	----	----	----	----	----	1



TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 11 of 39 Pages)

<b>MODBUS</b>	<b>HEX</b>	<b>DESCRIPTION</b>	<b>MIN</b>	<b>MAX</b>	<b>STEP</b>	<b>UNITS</b>	<b>FORMAT</b>	<b>DEFAULT</b>	<b>SIZE IN WORDS</b>
<b>ATS OPERATION COUNTERS</b>									
32080	081F	Days Powered Up	----	----	----	Days	F1	N/A	1
32081	0820	Total Time On S1	----	----	----	Hrs	F9	N/A	2
32083	0822	Total Time On S2	----	----	----	Hrs	F9	N/A	2
32085	0824	Total Time Load w/o Power	----	----	----	S	F9	N/A	2
32087	0826	Total Transfers (S1>S2 & S2>S1)	----	----	----	----	F1	N/A	1
32088	0827	Reserved	----	----	----	----	----	----	1
to	to		----	----	----	----	----	----	----
32092	082B	Reserved	----	----	----	----	----	----	1
<b>ATS CONTROL</b>									
32093	082C	ATS Active State	----	----	----	----	FC200	N/A	1
32094	082D	ATS Operating Mode	----	----	----	----	FC201	N/A	1
32095	082E	CT Extended Parallel Time	----	----	----	ms	F1	N/A	1
32096	082F	Switch Position	----	----	----	----	FC202	N/A	1
32097	0830	Reserved	----	----	----	----	----	----	1
32098	0831	ReXfer Timer Bypass	0	1	1	----	FC126	0	1
32099	0832	Block Xfer	0	1	1	----	FC126	0	1
32100	0833	Load Shed Status	0	1	1	----	FC126	0	1
32101	0834	Transition Mode Select	0	2	1	----	FC332	0	1
32102	0835	Auto/Manual Select	0	2	1	----	FC317	0	1
32103	0836	Commit	0	1	1	----	FC126	0	1
32104	0837	Reserved	----	----	----	----	----	----	1
<b>ATS EXERCISER</b>									
32105	0838	Exerciser Status	----	----	----	----	FC302	N/A	1
32106	0839	Last Exerciser Date	----	----	----	----	F18	N/A	2
32108	083B	Last Exerciser Time	----	----	----	----	F19	N/A	2
32110	083D	Next Exerciser Date	----	----	----	----	F18	N/A	2
32112	083F	Next Exerciser Time	----	----	----	----	F19	N/A	2
32114	0841	Reserved	----	----	----	----	----	----	1
32115	0842	Reserved	----	----	----	----	----	----	1
32116	0843	Reserved	----	----	----	----	----	----	1
<b>ATS TEST</b>									
32117	0844	Reserved	----	----	----	----	----	----	1
32118	0845	Reserved	----	----	----	----	----	----	1
<b>ATS PREFERRED SRC</b>									
32119	0846	Preferred SRC	----	----	----	----	FC161	N/A	1
32120	0847	Reserved	----	----	----	----	----	----	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 12 of 39 Pages)

<b>MODBUS</b>	<b>HEX</b>	<b>DESCRIPTION</b>	<b>MIN</b>	<b>MAX</b>	<b>STEP</b>	<b>UNITS</b>	<b>FORMAT</b>	<b>DEFAULT</b>	<b>SIZE IN WORDS</b>
<b>ATS GEN</b>									
32121	0848	Avg. Alt Source pF	----	----	----	----	F21	N/A	1
32122	0849	Avg. Alt Source kW	----	----	----	kW	F1	N/A	1
32123	084A	Max Alt Source Current	----	----	----	A	F1	N/A	1
32124	084B	Max Alt Source Voltage Dips	----	----	----	%	F2	N/A	1
32125	084C	Max Alt Source Freq Dip	----	----	----	Hz	F2	N/A	1
32126	084D	Gen Shutdown Date	----	----	----	----	F18	N/A	2
32128	084F	Gen Shutdown Time	----	----	----	----	F19	N/A	2
32130	0851	Time To ShutDown Gen	----	----	----	----	F24	N/A	1
32131	0852	Date Gen Start Sent 2	----	----	----	----	F18	N/A	2
32133	0854	Time Gen Start Sent	----	----	----	----	F19	N/A	2
32135	0856	Date Gen Stop Sent	----	----	----	----	F18	N/A	2
32137	0858	Time Gen Start Stop	----	----	----	----	F19	N/A	2
32139	085A	Gen Supply OK Date	----	----	----	----	F18	N/A	2
32141	085C	Gen Supply OK Time	----	----	----	----	F19	N/A	2
32143	085E	Alt Source Startup Time	----	----	----	s	F1	N/A	1
32144	085F	Max Alt Source Volt THD	----	----	----	%	F1	N/A	1
32145	0860	Time Gen Start Removed	----	----	----	----	F19	N/A	2
32147	0862	Reserved	----	----	----	----	----	----	1
<b>ATS R50</b>									
32148	0863	In Phase Monitor Status	----	----	----	----	FC306	N/A	1
32149	0864	Reserved	----	----	----	----	----	----	1
32150	0865	S1 S2 Phase A Difference	----	----	----	----	F16	N/A	1
32151	0866	Reserved	----	----	----	----	----	----	1
32152	0867	Reserved	----	----	----	----	----	----	1
32153	0868	Reserved	----	----	----	----	----	----	1
32155	086A	Reserved	----	----	----	----	----	----	1
32156	086B	Reserved	----	----	----	----	----	----	1
32157	086C	Reserved	----	----	----	----	----	----	1
32158	086D	Reserved	----	----	----	----	----	----	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 13 of 39 Pages)

<u>MODBUS</u>	<u>HEX</u>	<u>DESCRIPTION</u>	<u>MIN</u>	<u>MAX</u>	<u>STEP</u>	<u>UNITS</u>	<u>FORMAT</u>	<u>DEFAULT</u>	<u>SIZE IN WORDS</u>
<b>ATS S1 COUNTERS</b>									
32159	086E	Total Primary Source Failures	----	----	----	----	F1	N/A	1
32160	086F	S1 Accum. Avail.	----	----	----	Hrs	F9	N/A	2
32162	0871	S1 Accum. Unavail.	----	----	----	Hrs	F9	N/A	2
32164	0873	S1 Avail. Since Last Restore	----	----	----	Hrs	F9	N/A	2
32166	0875	S1 Last Unavail. Time	----	----	----	Hrs	F9	N/A	2
32168	0877	Last Primary Source Fail Date	----	----	----	----	F18	N/A	2
32170	0879	Last Primary Source Fail Time	----	----	----	----	F19	N/A	2
32172	087B	S1 Date Stamp Last Restore	----	----	----	----	F18	N/A	2
32174	087D	Time Primary Ret (or Test Reset)	----	----	----	----	F19	N/A	2
32176	087F	Last Transfer to S1 Date	----	----	----	----	F18	N/A	2
32178	0881	Last Transfer to S1 Time	----	----	----	----	F19	N/A	2
32180	0883	Reserved	----	----	----	----	----	----	1
32181	0884	Reserved	----	----	----	----	----	----	1
<b>ATS S2 COUNTERS</b>									
32182	0885	Number of S2 Failures	----	----	----	----	F1	N/A	1
32183	0886	S2 Accum. Avail.	----	----	----	Hrs	F9	N/A	2
32185	0888	S2 Accum. Unavail.	----	----	----	Hrs	F9	N/A	2
32187	088A	S2 Avail. Since Last Restore	----	----	----	Hrs	F9	N/A	2
32189	088C	S2 Last Unavail. Time	----	----	----	Hrs	F9	N/A	2
32191	088E	S2 Date Stamp Last Fail	----	----	----	----	F18	N/A	2
32193	0890	S2 Time Stamp Last Fail	----	----	----	----	F19	N/A	2
32195	0892	S2 Date Stamp Last Restore	----	----	----	----	F18	N/A	2
32197	0894	S2 Time Stamp Last Restore	----	----	----	----	F19	N/A	2
32199	0896	Last Transfer to S2 Date	----	----	----	----	F18	N/A	2
32201	0898	Last Transfer to S2 Time	----	----	----	----	F19	N/A	2
32203	089A	Total Time on Alt. Source	----	----	----	Min	F1	N/A	1
32204	089B	Reserved	----	----	----	----	----	----	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 14 of 39 Pages)

<u>MODBUS</u>	<u>HEX</u>	<u>DESCRIPTION</u>	<u>MIN</u>	<u>MAX</u>	<u>STEP</u>	<u>UNITS</u>	<u>FORMAT</u>	<u>DEFAULT</u>	<u>SIZE IN WORDS</u>
<b>ATS S1 STATUS</b>									
32205	089C	Reserved	----	----	----	----	----	----	1
32206	089D	Reserved	----	----	----	----	----	----	1
32207	089E	Reserved	----	----	----	----	----	----	1
32208	089F	Reserved	----	----	----	----	----	----	1
32209	08A0	Reserved	----	----	----	----	----	----	1
32210	08A1	Reserved	----	----	----	----	----	----	1
32211	08A2	S1 Phase Rotation					FC311	N/A	1
32212	08A3	Reserved	----	----	----	----	----	----	1
to	to	Reserved	----	----	----	----	----	----	1
32220	08AB	Reserved	----	----	----	----	----	----	1
<b>ATS S2 STATUS</b>									
32221	08AC	Reserved	----	----	----	----	----	----	1
32222	08AD	Reserved	----	----	----	----	----	----	1
32223	08AE	Reserved	----	----	----	----	----	----	1
32224	08AF	Reserved	----	----	----	----	----	----	1
32225	08B0	Reserved	----	----	----	----	----	----	1
32226	08B1	Reserved	----	----	----	----	----	----	1
32227	08B2	S1 Phase Rotation					FC311	N/A	1
32228	08B3	Reserved	----	----	----	----	----	----	1
to	to	Reserved	----	----	----	----	----	----	1
32236	08BB	Reserved	----	----	----	----	----	----	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 15 of 39 Pages)

<u>MODBUS</u>	<u>HEX</u>	<u>DESCRIPTION</u>	<u>MIN</u>	<u>MAX</u>	<u>STEP</u>	<u>UNITS</u>	<u>FORMAT</u>	<u>DEFAULT</u>	<u>SIZE IN WORDS</u>
ATS TIMERS									
32237	08BC	Active ATS Timer – Time Remaining	----	----	----	----	F24	N/A	1
32238	08BD	ATS Timer Active 1	----	----	----	----	FC300	N/A	1
32239	08BE	Active Elevator Timer	----	----	----	----	FC301	N/A	1
32240	08BF	N to Pref Tmr Countdown	----	----	----	----	F24	N/A	1
32241	08C0	N to NonPref Tmr Countdown	----	----	----	----	F24	N/A	1
32242	08C1	EX-Parallel Timer Countdown	----	----	----	----	F24	N/A	1
32243	08C2	Gen Run Timer Countdown	----	----	----	----	F24	N/A	1
32244	08C3	Gen Sag Timer Countdown	----	----	----	S	F24	N/A	1
32245	08C4	OLC Timer Countdown	----	----	----	----	F24	N/A	1
32246	08C5	Engine Start1 Tmr Countdown	----	----	----	----	F24	N/A	1
32247	08C6	Reserved	----	----	----	----	----	----	1
32248	08C7	Sol Save Timer Countdown	----	----	----	----	F24	N/A	1
32249	08C8	Src Qual Timer Countdown	----	----	----	----	F24	N/A	1
32250	08C9	Sync Timer Countdown	----	----	----	----	F24	N/A	1
32251	08CA	to Timer Countdown	----	----	----	----	F24	N/A	1
32252	08CB	Time Delay to Engine Cooldown Timer Countdown	----	----	----	----	F24	N/A	1
32253	08CC	Reserved	----	----	----	----	----	----	1
32254	08CD	Virtual Input Timer Countdown 1	----	----	----	----	F24	N/A	1
32255	08CE	Time Delay to Non-Pref Source Timer Countdown	----	----	----	----	F24	N/A	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 16 of 39 Pages)

<u>MODBUS</u>	<u>HEX</u>	<u>DESCRIPTION</u>	<u>MIN</u>	<u>MAX</u>	<u>STEP</u>	<u>UNITS</u>	<u>FORMAT</u>	<u>DEFAULT</u>	<u>SIZE IN WORDS</u>
<b>LOAD CONTROL TIMERS</b>									
32256	08CF	Pre LC1Timer Countdown	----	----	----	----	F24	N/A	1
32257	08D0	Pre LC2Timer Countdown	----	----	----	----	F24	N/A	1
32258	08D1	Pre LC3Timer Countdown	----	----	----	----	F24	N/A	1
32259	08D2	Pre LC4Timer Countdown	----	----	----	----	F24	N/A	1
32260	08D3	Pre LC5Timer Countdown	----	----	----	----	F24	N/A	1
32261	08D4	Pre LC6Timer Countdown	----	----	----	----	F24	N/A	1
32262	08D5	Post LC1Timer Countdown	----	----	----	----	F24	N/A	1
32263	08D6	Post LC2Timer Countdown	----	----	----	----	F24	N/A	1
32264	08D7	Post LC3Timer Countdown	----	----	----	----	F24	N/A	1
32265	08D8	Post LC4Timer Countdown	----	----	----	----	F24	N/A	1
32266	08D9	Post LC5Timer Countdown	----	----	----	----	F24	N/A	1
32267	08DA	Post LC6Timer Countdown	----	----	----	----	F24	N/A	1
32268	08DB	Utility Sag Timer	0	30	1	Sec	F24	0	1
32269	08DC	Reserved	----	----	----	----	----	----	1
32270	08DD	Reserved	----	----	----	----	----	----	1
32271	08DE	Reserved	----	----	----	----	----	----	1
32272	08DF	Reserved	----	----	----	----	----	----	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 17 of 39 Pages)

<b>MODBUS</b>	<b>HEX</b>	<b>DESCRIPTION</b>	<b>MIN</b>	<b>MAX</b>	<b>STEP</b>	<b>UNITS</b>	<b>FORMAT</b>	<b>DEFAULT</b>	<b>SIZE IN WORDS</b>
<b>SETPOINTS</b>									
<b>COMMANDS</b>									
40001	0000	Reserved	----	----	----	----	----	----	1
40008	9C48	ATS Ship Date	0	0X0C1F082E	0	----	F18	----	1
40010	9C4A	ATS Startup Date	0	0X0C1F082E	0	----	F18	----	1
40012	9C4C	Last Maintenance Date	0	0X0C1F082E	0	----	F18	----	1
40014	9C4E	Russelectric Job Number	0		1	----	F22	22	10
40024	9C58	Russelectric Mod Number	0		1	----	F22	22	10
40025	9C59	Reserved	----	----	----	----	----	----	1
to	to	----	----	----	----	----	----	----	----
40128	007F	Reserved	----	----	----	----	----	----	1
40129	0080	Command address	0	65536	0	----	F1	0	1
40130	0081	Command Function	0	65536	0	----	F1	0	1
40131	0082	Command Data 1	0	65536	0	----	F1	0	1
40132	0083	Command Data 2	0	65536	0	----	F1	0	1
40133	0084	Command Data 3	0	65536	0	----	F1	0	1
40134	0085	Command Data 4	0	65536	0	----	F1	0	1
40135	0086	Command Data 5	0	65536	0	----	F1	0	1
40136	0087	Command Data 6	0	65536	0	----	F1	0	1
40137	0088	Command Data 7	0	65536	0	----	F1	0	1
40138	0089	Command Data 8	0	65536	0	----	F1	0	1
40139	008A	Command Data 9	0	65536	0	----	F1	0	1
40140	008B	Command Data 10	0	65536	0	----	F1	0	1
40141	008C	Reserved	----	----	----	----	----	----	1
to	to	----	----	----	----	----	----	----	----
40171	00AA	Reserved	----	----	----	----	----	----	1
<b>COMMUNICATIONS SETTINGS</b>									
40172	00AB	Slave Address	1	254	1	----	F1	254	1
40173	00AC	RS485 Baud Rate	0	4	1	----	FC101	4	1
40174	00AD	Reserved	----	----	----	----	----	----	1
to	to	----	----	----	----	----	----	----	----
40180	00B3	Reserved	----	----	----	----	----	----	1
40181	00B4	NTP IP Address	0	0xFFFFFFFF	1	----	FC150	0	2
40183	00B6	Ethernet IP address	0	0xFFFFFFFF	1	----	FC150	0	2
40185	00B8	Ethernet subnet mask	0	0xFFFFFFFF	1	----	FC150	0xFFFFFFFFC00	2
40187	00BA	Ethernet gateway address	0	0xFFFFFFFF	1	----	FC150		2
40189	00BC	Reserved	----	----	----	----	----	----	1
to 1	to	----	----	----	----	----	----	----	----
40227	00E2	Reserved	----	----	----	----	----	----	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 18 of 39 Pages)

MODBUS	HEX	DESCRIPTION	MIN	MAX	STEP	UNITS	FORMAT	DEFAULT	SIZE IN WORDS
<b>REAL-TIME CLOCK/DAYLIGHT SAVINGS</b>									
40228	00E3	Set Date	0	0x0C1F082E	0	----	F18	0	2
40230	00E5	Set Time	0	0x173B3B63	0	----	F19	0	2
40232	00E7	Time Offset From UTC	-2400	2400	25	Hrs	F6	0	1
40233	00E8	Reserved	----	----	----	----	----	----	1
40234	00E9	Daylight Savings	0	1	1	----	FC126	0	1
40235	00EA	DST Start Month	0	12	1	----	FC169	0	1
40236	00EB	DST Start Week	0	5	1	----	FC170	0	1
40237	00EC	DST Start Weekday	0	7	1	----	FC171	0	1
40238	00ED	DST End Month	0	12	1	----	FC169	0	1
40239	00EE	DST End Week	0	5	1	----	FC170	0	1
40240	00EF	DST End Weekday	0	7	1	----	FC171	0	1
40241	00F0	Time (broadcast)	0	389757795	0	----	F18	0	2
40243	00F2	Date (broadcast)	0	203360302	0	----	F19	0	2
40245	00F4	Reserved	----	----	----	----	----	----	1
to	to	----	----	----	----	----	----	----	----
40261	0104	Reserved	----	----	----	----	----	----	1
<b>VIRTUAL INPUT</b>									
40262	0105	Virtual Input 32-1 (Bit Field)	0	0xFFFFFFF	1	----	FC167	0	2
40264	0107	Reserved	----	----	----	----	----	----	1
40265	0108	Reserved	----	----	----	----	----	----	1
<b>CURRENT SENSING</b>									
40266	0109	Phase CT Type	2	2	1	----	FC105	0	1
40267	010A	CT Primary	100	1000	1	A	F1	100	1
40268	010B	Ground CT Type	0	2	1	----	FC104	1	1
40269	010C	Reserved	----	----	----	----	----	----	1
40270	010D	CT Primary Turns	1	10	1	----	F1	1	1
40271	010E	Reserved	----	----	----	----	----	----	1
to	to	----	----	----	----	----	----	----	----
40275	0112	Reserved	----	----	----	----	----	----	1
<b>VOLTAGE SENSING</b>									
40276	0113	3-Phase Voltage Connection S1	0	1	1	----	FC106	0	1
40277	0114	Aux VT Connection	0	8	1	----	FC176	0	1
40278	0115	Aux VT Primary	110	690	1	V	F1	415	1
40279	0116	Aux VT Secondary	110	300	1	V	F1	110	1
40280	0117	3 Phase Voltage Connection S2	0	1	1	----	FC106	0	1
40281	0118	VT Primary	120	38000	1	V	F1	480	1
40282	0119	Reserved	----	----	----	----	----	----	1
40283	011A	Reserved	----	----	----	----	----	----	1
<b>CONTROLLER SETUP</b>									
40284	011B	Supply Frequency	0	1	1	Hz	FC107	0	1
40285	011C	Reserved	----	----	----	----	----	----	10
to	to	----	----	----	----	----	----	----	----
40316	023B	Reserved	----	----	----	----	----	----	1



TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 19 of 39 Pages)

MODBUS	HEX	DESCRIPTION	MIN	MAX	STEP	UNITS	FORMAT	DEFAULT	SIZE IN WORDS
PROCESS INTERLOCK									
40317	013C	Reserved	----	----	----	----	----	----	1
40318	013D	IL A Name	0	10	1	----	F22	4	10
40328	0147	IL A Function	0	3	1	----	FC140	0	1
40329	0148	IL A Inst Alarm	0	1	1	----	FC126	0	1
40330	0149	Reserved	----	----	----	----	----	----	1
40331	014A	IL A Override	----	----	----	----	----	----	----
40332	014B	IL A Healthy State 1	0	1	1	----	FC116	1	1
40333	014C	Reserved	----	----	----	----	----	----	1
to	to	----	----	----	----	----	----	----	----
40337	0150	Reserved	----	----	----	----	----	----	1
40338	0151	IL B Name	0	10	1	----	F22	4	10
40348	015B	IL B Function	0	3	1	----	FC140	0	1
40349	015C	IL B Inst Alarm	0	1	1	----	FC126	0	1
40350	015D	Reserved	----	----	----	----	----	----	1
40351	015E	IL B Override	----	----	----	----	----	----	----
40352	015F	IL B Healthy State 1	0	1	1	----	FC116	1	1
40353	0160	Reserved	----	----	----	----	----	----	1
to	to	----	----	----	----	----	----	----	----
40357	0164	Reserved	----	----	----	----	----	----	1
40358	0165	IL C Name	0	10	1	----	F22	4	10
40368	016F	IL C Function	0	3	1	----	FC140	0	1
40369	0170	IL C Inst Alarm	0	1	1	----	FC126	0	1
40370	0171	Reserved	----	----	----	----	----	----	1
40371	0172	IL C Override	----	----	----	----	----	----	----
40372	0173	IL C Healthy State 1	0	1	1	----	FC116	1	1
40373	0174	Reserved	----	----	----	----	----	----	1
to	to	----	----	----	----	----	----	----	----
40377	0178	Reserved	----	----	----	----	----	----	1
40378	0179	IL D Name	0	10	1	----	F22	4	10
40388	0183	IL D Function	0	3	1	----	FC140	0	1
40389	0184	IL D Inst Alarm	0	1	1	----	FC126	0	1
40390	0185	Reserved	----	----	----	----	----	----	1
40391	0186	IL D Override	----	----	----	----	----	----	----
40392	0187	IL D Healthy State 1	0	1	1	----	FC116	1	1
40393	0188	Reserved	----	----	----	----	----	----	1
to	to	----	----	----	----	----	----	----	----
40397	018C	Reserved	----	----	----	----	----	----	1
40398	018D	IL E Name	0	10	1	----	F22	4	10
40408	0197	IL E Function	0	3	1	----	FC140	0	1
40409	0198	IL E Inst Alarm	0	1	1	----	FC126	0	1
40410	0199	Reserved	----	----	----	----	----	----	1
40411	019A	IL E Override	----	----	----	----	----	----	----
40412	019B	IL E Healthy State 1	0	1	1	----	FC116	1	1
40413	019C	Reserved	----	----	----	----	----	----	1
to	to	----	----	----	----	----	----	----	----
40417	01A0	Reserved	----	----	----	----	----	----	1
40418	01A1	IL F Name	0	10	1	----	F22	4	10
40428	01AB	IL F Function	0	3	1	----	FC140	0	1
40429	01AC	IL F Inst Alarm	0	1	1	----	FC126	0	1
40430	01AD	Reserved	----	----	----	----	----	----	1
40431	01AE	IL F Override	----	----	----	----	----	----	----
40432	01AF	IL F Healthy State 1	0	1	1	----	FC116	1	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 20 of 39 Pages)

<u>MODBUS</u>	<u>HEX</u>	<u>DESCRIPTION</u>	<u>MIN</u>	<u>MAX</u>	<u>STEP</u>	<u>UNITS</u>	<u>FORMAT</u>	<u>DEFAULT</u>	<u>SIZE IN WORDS</u>
PROCESS INTERLOCK---Cont'd									
40433	01B0	Reserved	----	----	----	----	----	----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
40437	01B4	Reserved	----	----	----	----	----	----	1
40438	01B5	IL G Name	0	10	1	----	F22	4	10
40448	01BF	IL G Function	0	3	1	----	FC140	0	1
40449	01C0	IL G Inst Alarm	0	1	1	----	FC126	0	1
40450	01C1	Reserved	----	----	----	----	----	----	1
40451	01C2	IL G Override	----	----	----	----	----	----	----
40452	01C3	IL G Healthy State 1	0	1	1	----	FC116	1	1
40453	01C4	Reserved	----	----	----	----	----	----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
40457	01C8	Reserved	----	----	----	----	----	----	1
40458	01C9	IL H Name	0	10	1	----	F22	4	10
40468	01D3	IL H Function	0	3	1	----	FC140	0	1
40469	01D4	IL H Inst Alarm	0	1	1	----	FC126	0	1
40470	01D5	Reserved	----	----	----	----	----	----	1
40471	01D6	IL H Override	----	----	----	----	----	----	----
40472	01D7	IL H Healthy State 1	0	1	1	----	FC116	1	1
40473 1	01D8	Reserved	----	----	----	----	----	----	1
to 1	to	-----	-----	-----	-----	-----	-----	-----	-----
40477	01DC	Reserved	----	----	----	----	----	----	1
40478	01DD	IL I Name	0	10	1	----	F22	4	10
40488	01E7	IL I Function	0	3	1	----	FC140	0	1
40489	01E8	IL I Inst Alarm	0	1	1	----	FC126	0	1
40490	01E9	Reserved	----	----	----	----	----	----	1
40491	01EA	IL I Override	----	----	----	----	----	----	----
40492	01EB	IL I Healthy State 1	0	1	1	----	FC116	1	1
40493	01EC	Reserved	----	----	----	----	----	----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
40497	01F0	Reserved	----	----	----	----	----	----	1
40498	01F1	IL J Name	0	10	1	----	F22	4	10
40508	01FB	IL J Function	0	3	1	----	FC140	0	1
40509	01FC	IL J Inst Alarm	0	1	1	----	FC126	0	1
40510	01FD	Reserved	----	----	----	----	----	----	1
40511	01FE	IL J Override	----	----	----	----	----	----	----
40512	01FF	IL J Healthy State 1	0	1	1	----	FC116	1	1
40513	0200	Reserved	----	----	----	----	----	----	1
40514	0201	Reserved	----	----	----	----	----	----	1
40515	0202	Reserved	----	----	----	----	----	----	1
40516	0203	Reserved	----	----	----	----	----	----	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 21 of 39 Pages)

<b>MODBUS</b>	<b>HEX</b>	<b>DESCRIPTION</b>	<b>MIN</b>	<b>MAX</b>	<b>STEP</b>	<b>UNITS</b>	<b>FORMAT</b>	<b>DEFAULT</b>	<b>SIZE IN WORDS</b>
<b>COMMUNICATION SETUP</b>									
40517	0204	Comms OK Evaluation	0	64	1	----	FC131	1	1
40518	0205	Reserved	-----	-----	-----	-----	-----	-----	1
40519	0206	Comm Failure Fault	5	30	5	s	F1*	30	1
40520	0207	Comm Failure Alarm	5	30	5	s	F1*	30	1
40521	0208	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
40523	020A	Reserved	-----	-----	-----	-----	-----	-----	1
<b>USER MAP ADDRESSES</b>									
40524	020B	User Map Address 1	30001	43765	1	----	F1	30001	1
40525	020C 1	User Map Address 2	30001	43765	1	----	F1	30001	1
40526	020D	User Map Address 3	30001	43765	1	----	F1	30001	1
40527	020E	User Map Address 4	30001	43765	1	----	F1	30001	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
40645	0284	User Map Address 122	30001	43765	1	----	F1	30001	1
40646	0285	User Map Address 112	30001	43765	1	----	F1	30001	1
40647	0286	User Map Address 124	30001	43765	1	----	F1	30001	1
40648	0287	User Map Address 125	30001	43765	1	----	F1	30001	1
40649	0288	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
40658	0291	Reserved	-----	-----	-----	-----	-----	-----	1
<b>EVENT RECORDER</b>									
40659	0292	Event Recorder Function	0	1	1	----	FC126	1	1
40660	0293	Recording of Fault Events	0	1	1	----	FC126	1	1
40661	0294	Recording of Alarm Events	0	1	1	----	FC126	1	1
40662	0295	Recording of Control Events	0	1	1	----	FC126	1	1
40663	0296	Reserved	-----	-----	-----	-----	-----	-----	1
40664	0297	Reserved	-----	-----	-----	-----	-----	-----	1
40665	0298	Reserved	-----	-----	-----	-----	-----	-----	1
40666	0299	Recording of Set Time/Date Events	0	1	1	----	FC126	0	1
40667	029A	Event Record Selector	1	65535	1	----	F1	1	1
40668	029B	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
40671	029D	Reserved	-----	-----	-----	-----	-----	-----	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 22 of 39 Pages)

MODBUS	HEX	DESCRIPTION	MIN	MAX	STEP	UNITS	FORMAT	DEFAULT	SIZE IN WORDS
MEMORY									
40672	029F	Trace Memory Channel Selector	0	11	1	----	F26	0	1
40673	02A0	Reserved	-----	-----	-----	-----	-----	-----	1
40674	02A1	Trace Memory Sample Index	0	2048	1	----	F1	0	1
40675	02A2	Trigger Source	1	40964	1	----	FC132	1	1
40676	02A3	Trigger Position	0	100	1	%	F1	0	1
40677	02A4	Trigger Mode	0	1	1	----	FC148	0	1
40678	02A5	Reserved	-----	-----	-----	-----	-----	-----	1
DATA LOGGER									
40679	02A6	Data Log Number Selector	0	65535	1	----	F1	0	1
40680	02A7	Data Log Channel Selector	-32767	32767	1	----	F4	0	1
40681	02A8	Data Log Sample Selector (DLSS)	-32767	32767	1	----	F4	0	1
40682	02A9	Sample Rate	0	3	1	----	F74	1	1
40683	02AA	Continuous Mode	0	1	1	----	FC126	0	1
40684	02AB	Buffer Organization	0	1	1	----	F1	0	1
40685	02AC	Trigger Position	0	100	1	%	F1	25	1
40686	02AD	Trigger Source	0	40962	1	----	FC132	0	1
40687	02AE	Channel 1 Source	0	26	1	----	F77	1	1
40688	02AF	Channel 2 Source	0	26	1	----	F77	1	1
40689	02B0	Channel 3 Source	0	26	1	----	F77	1	1
40690	02B1	Channel 4 Source	0	26	1	----	F77	1	1
40691	02B2	Channel 5 Source	0	26	1	----	F77	1	1
40692	02B3	Channel 6 Source	0	26	1	----	F77	1	1
40693	02B4	Channel 7 Source	0	26	1	----	F77	1	1
40694	02B5	Channel 8 Source	0	26	1	----	F77	1	1
40695	02B6	Channel 9 Source	0	26	1	----	F77	1	1
40696	02B7	Channel 10 Source	0	26	1	----	F77	1	1
40697	02B8	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
40856	0357	Reserved	-----	-----	-----	-----	-----	-----	1
CURRENT UNBALANCE (REQUIRED=IO-A)									
40857	0358	Current Unbalance Alarm Level	4	41	1	%	F1*	15	1
40858	0359	Current Unbalance Alarm Delay	1	60	1	s	F1	1	1
40859	035A	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41039	040E	Reserved	-----	-----	-----	-----	-----	-----	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 23 of 39 Pages)

MODBUS	HEX	DESCRIPTION	MIN	MAX	STEP	UNITS	FORMAT	DEFAULT	SIZE IN WORDS
CALIBRATION									
41040	040F	Calibration Date	0	0X0C1F082E	1	----	F18	0	2
41042	0411	Calibration Time	0	0X173B3B63	1	----	F19	0	
41044	0413	Reserved	----	----	----	----	----	----	1
to t	to	-----	-----	-----	-----	-----	-----	-----	-----
41105	0450	Reserved	----	----	----	----	----	----	1
SECURITY									
41106	0451	Passcode Level 1	11111	55556	1	----	F1*	11111	1
41107	0452	Passcode Level 2	11111	55556	1	----	F1*	22222	1
41108	0453	Reserved	----	----	----	----	----	----	1
41109	0454	Access Switch Level	1	3	1	----	F1	1	1
41110	0455	Comms Security	0	1	1	----	FC126	0	1
41111	0456	Setpoint Access	0	1	1	----	FC126	1	1
41112	0457	Passcode Entry				----			
41113	0458	Reserved	----	----	----	----	----	----	1
41114	0459	Reserved	----	----	----	----	----	----	1
41115	045A	Current Cutoff Level	0	10	1	Amps	F2	2	1
41116	045B	Voltage Cutoff Level	1	30	1	Volts	F1	20	1
FLEXLOGIC TIMERS									
41117	045C	Timer 1 Type	0	4	0	----	FC141	0	1
41118	045D	Timer 1 Pickup Delay	0	1000	1	----	F1	1	1
41119	045E	Timer 1 Dropout Delay	0	1000	1	----	F1	1	1
41120	045F	Reserved	----	----	----	----	----	----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41124	0463	Reserved	----	----	----	----	----	----	1
41125	0464	Timer 2 Type	0	4	0	----	FC141	0	1
41126	0465	Timer 2 Pickup Delay	0	1000	1	----	F1	1	1
41127	0466	Timer 2 Dropout Delay	0	1000	1	----	F1	1	1
41128	0467	Reserved	----	----	----	----	----	----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41132	046B	Reserved	----	----	----	----	----	----	1
41133	046C	Timer 3 Type	0	4	0	----	FC141	0	1
41134	046D	Timer 3 Pickup Delay	0	1000	1	----	F1	1	1
41135	046E	Timer 3 Dropout Delay	0	1000	1	----	F1	1	1
41136	046F	Reserved	----	----	----	----	----	----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41140	0473	Reserved	----	----	----	----	----	----	1
41141	0474	Timer 4 Type	0	4	0	----	FC141	0	1
41142	0475	Timer 4 Pickup Delay	0	1000	1	----	F1	1	1
41143	0476	Timer 4 Dropout Delay	0	1000	1	----	F1	1	1
41144	0477	Reserved	----	----	----	----	----	----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41148	047B	Reserved	----	----	----	----	----	----	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 24 of 39 Pages)

<b>MODBUS</b>	<b>HEX</b>	<b>DESCRIPTION</b>	<b>MIN</b>	<b>MAX</b>	<b>STEP</b>	<b>UNITS</b>	<b>FORMAT</b>	<b>DEFAULT</b>	<b>SIZE IN WORDS</b>
<b>FLEXLOGIC TIMERS---Cont'd</b>									
41149	047C	Timer 5 Type	0	4	0	----	FC141	0	1
41150	047D	Timer 5 Pickup Delay	0	1000	1	----	F1	1	1
41151	047E	Timer 5 Dropout Delay	0	1000	1	----	F1	1	1
41152	047F	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41156	0483	Reserved	-----	-----	-----	-----	-----	-----	1
41157	0484	Timer 6 Type	0	4	0	----	FC141	0	1
41158	0485	Timer 6 Pickup Delay	0	1000	1	----	F1	1	1
41159	0486	Timer 6 Dropout Delay	0	1000	1	----	F1	1	1
41160	0487	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41164	048B	Reserved	-----	-----	-----	-----	-----	-----	1
41165	048C	Timer 7 Type	0	4	0	----	FC141	0	1
41166	048D	Timer 7 Pickup Delay	0	1000	1	----	F1	1	1
41167	048E	Timer 7 Dropout Delay	0	1000	1	----	F1	1	1
41168	048F	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41172	0493	Reserved	-----	-----	-----	-----	-----	-----	1
41173	0494	Timer 8 Type	0	4	0	----	FC141	0	1
41174	0495	Timer 8 Pickup Delay	0	1000	1	----	F1	1	1
41175	0496	Timer 8 Dropout Delay	0	1000	1	----	F1	1	1
41176	0497	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41180	049B	Reserved	-----	-----	-----	-----	-----	-----	1
41181	049C	Timer 9 Type	0	4	0	----	FC141	0	1
41182	049D	Timer 9 Pickup Delay	0	1000	1	----	F1	1	1
41183	049E	Timer 9 Dropout Delay	0	1000	1	----	F1	1	1
41184	049F	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41188	04A3	Reserved	-----	-----	-----	-----	-----	-----	1
41189	04A4	Timer 10 Type	0	4	0	----	FC141	0	1
41190	04A5	Timer 10 Pickup Delay	0	1000	1	----	F1	1	1
41191	04A6	Timer 10 Dropout Delay	0	1000	1	----	F1	1	1
41192	04A7	Reserved	-----	-----	-----	-----	-----	-----	1
to 1	to	-----	-----	-----	-----	-----	-----	-----	-----
41196	04AB	Reserved	-----	-----	-----	-----	-----	-----	1
41197	04AC	Timer 11 Type	0	4	0	----	FC141	0	1
41198	04AD	Timer 11 Pickup Delay	0	1000	1	----	F1	1	1
41199	04AE	Timer 11 Dropout Delay	0	1000	1	----	F1	1	1
41200	04AF	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41204	04B3	Reserved	-----	-----	-----	-----	-----	-----	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 25 of 39 Pages)

<b>MODBUS</b>	<b>HEX</b>	<b>DESCRIPTION</b>	<b>MIN</b>	<b>MAX</b>	<b>STEP</b>	<b>UNITS</b>	<b>FORMAT</b>	<b>DEFAULT</b>	<b>SIZE IN WORDS</b>
<b>FLEXLOGIC TIMERS---Cont'd</b>									
41205	04B4	Timer 12 Type	0	4	0	----	FC141	0	1
41206	04B5	Timer 12 Pickup Delay	0	1000	1	----	F1	1	1
41207	04B6	Timer 12 Dropout Delay	0	1000	1	----	F1	1	1
41208	04B7	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41212	04BB	Reserved	-----	-----	-----	-----	-----	-----	1
41213	04BC	Timer 13 Type	0	4	0	----	FC141	0	1
41214	04BD	Timer 13 Pickup Delay	0	1000	1	----	F1	1	1
41215	04BE	Timer 13 Dropout Delay	0	1000	1	----	F1	1	1
41216	04BF	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41220	04C3	Reserved	-----	-----	-----	-----	-----	-----	1
41221	04C4	Timer 14 Type	0	4	0	----	FC141	0	1
41222	04C5	Timer 14 Pickup Delay	0	1000	1	----	F1	1	1
41223	04C6	Timer 14 Dropout Delay	0	1000	1	----	F1	1	1
41224	04C7	Reserved	-----	-----	-----	-----	-----	-----	1
to	to 1	-----	-----	-----	-----	-----	-----	-----	-----
41228	04CB	Reserved	-----	-----	-----	-----	-----	-----	1
41229	04CC	Timer 15 Type	0	4	0	----	FC141	0	1
41230	04CD	Timer 15 Pickup Delay	0	1000	1	----	F1	1	1
41231	04CE	Timer 15 Dropout Delay	0	1000	1	----	F1	1	1
41232	04CF	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41236	04D3	Reserved	-----	-----	-----	-----	-----	-----	1
41237	04D4	Timer 16 Type	0	4	0	----	FC141	0	1
41238	04D5	Timer 16 Pickup Delay	0	1000	1	----	F1	1	1
41239	04D6	Timer 16 Dropout Delay	0	1000	1	----	F1	1	1
41240	04D7	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41244	04DB	Reserved	-----	-----	-----	-----	-----	-----	1
41245	04DC	Timer 17 Type	0	4	0	----	FC141	0	1
41246	04DD	Timer 17 Pickup Delay	0	1000	1	----	F1	1	1
41247	04DE	Timer 17 Dropout Delay	0	1000	1	----	F1	1	1
41248	04DF	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41252	04E3	Reserved	-----	-----	-----	-----	-----	-----	1
41253	04E4	Timer 18 Type	0	4	0	----	FC141	0	1
41254	04E5	Timer 18 Pickup Delay	0	1000	1	----	F1	1	1
41255	04E6	Timer 18 Dropout Delay	0	1000	1	----	F1	1	1
41256	04E7	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41260	04EB	Reserved	-----	-----	-----	-----	-----	-----	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 26 of 39 Pages)

<b>MODBUS</b>	<b>HEX</b>	<b>DESCRIPTION</b>	<b>MIN</b>	<b>MAX</b>	<b>STEP</b>	<b>UNITS</b>	<b>FORMAT</b>	<b>DEFAULT</b>	<b>SIZE IN WORDS</b>
<b>FLEXLOGIC TIMERS---Cont'd</b>									
41261	04EC	Timer 19 Type	0	4	0	----	FC141	0	1
41262	04ED	Timer 19 Pickup Delay	0	1000	1	----	F1	1	1
41263	04EE	Timer 19 Dropout Delay	0	1000	1	----	F1	1	1
41264	04EF	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41268	04F3	Reserved	-----	-----	-----	-----	-----	-----	1
41269	04F4	Timer 20 Type	0	4	0	----	FC141	0	1
41270	04F5	Timer 20 Pickup Delay	0	1000	1	----	F1	1	1
41271	04F6	Timer 20 Dropout Delay	0	1000	1	----	F1	1	1
41272	04F7	Reserved	-----	-----	-----	-----	-----	-----	1
to 1	to	-----	-----	-----	-----	-----	-----	-----	-----
41276	04FB	Reserved	-----	-----	-----	-----	-----	-----	1
41277	04FC	Timer 21 Type	0	4	0	----	FC141	0	1
41278	04FD	Timer 21 Pickup Delay	0	1000	1	----	F1	1	1
41279	04FE	Timer 21 Dropout Delay	0	1000	1	----	F1	1	1
41280	04FF	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41284	0503	Reserved	-----	-----	-----	-----	-----	-----	1
41285	0504	Timer 22 Type	0	4	0	----	FC141	0	1
41286	0505	Timer 22 Pickup Delay	0	1000	1	----	F1	1	1
41287	0506	Timer 22 Dropout Delay	0	1000	1	----	F1	1	1
41288	0507	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41292	050B	Reserved	-----	-----	-----	-----	-----	-----	1
41293	050C	Timer 23 Type	0	4	0	----	FC141	0	1
41294	050D	Timer 23 Pickup Delay	0	1000	1	----	F1	1	1
41295	050E	Timer 23 Dropout Delay	0	1000	1	----	F1	1	1
41296	050F	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41300	0513	Reserved	-----	-----	-----	-----	-----	-----	1
41301	0514	Timer 24 Type	0	4	0	----	FC141	0	1
41302	0515	Timer 24 Pickup Delay	0	1000	1	----	F1	1	1
41303	0516	Timer 24 Dropout Delay	0	1000	1	----	F1	1	1
41304	0517	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41308	051B	Reserved	-----	-----	-----	-----	-----	-----	1
41309	051C	Timer 25 Type	0	4	0	----	FC141	0	1
41310	051D	Timer 25 Pickup Delay	0	1000	1	----	F1	1	1
41311	051E	Timer 25 Dropout Delay	0	1000	1	----	F1	1	1
41312	051F	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41316	0523	Reserved	-----	-----	-----	-----	-----	-----	1



TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 27 of 39 Pages)

MODBUS	HEX	DESCRIPTION	MIN	MAX	STEP	UNITS	FORMAT	DEFAULT	SIZE IN WORDS
FLEXLOGIC TIMERS---Cont'd									
41317	0524	Timer 26 Type	0	4	0	----	FC141	0	1
41318	0525	Timer 26 Pickup Delay	0	1000	1	----	F1	1	1
41319	0526	Timer 26 Dropout Delay	0	1000	1	----	F1	1	1
41320	0527	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41324	052B	Reserved	-----	-----	-----	-----	-----	-----	1
41325	052C	Timer 27 Type	0	4	0	----	FC141	0	1
41326	052D	Timer 27 Pickup Delay	0	1000	1	----	F1	1	1
41327	052E	Timer 27 Dropout Delay	0	1000	1	----	F1	1	1
41328	052F	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41332	0533	Reserved	-----	-----	-----	-----	-----	-----	1
41333	0534	Timer 28 Type	0	4	0	----	FC141	0	1
41334	0535	Timer 28 Pickup Delay	0	1000	1	----	F1	1	1
41335	0536	Timer 28 Dropout Delay	0	1000	1	----	F1	1	1
41336	0537	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41340	053B	Reserved	-----	-----	-----	-----	-----	-----	1
41341	053C	Timer 29 Type	0	4	0	----	FC141	0	1
41342	053D	Timer 29 Pickup Delay	0	1000	1	----	F1	1	1
41343	053E	Timer 29 Dropout Delay	0	1000	1	----	F1	1	1
41344	053F	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41348	0543	Reserved	-----	-----	-----	-----	-----	-----	1
41349	0544	Timer 30 Type	0	4	0	----	FC141	0	1
41350	0545	Timer 30 Pickup Delay	0	1000	1	----	F1	1	1
41351	0546	Timer 30 Dropout Delay	0	1000	1	----	F1	1	1
41352	0547	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41356	054B	Reserved	-----	-----	-----	-----	-----	-----	1
41357	054C	Timer 31 Type	0	4	0	----	FC141	0	1
41358	054D	Timer 31 Pickup Delay	0	1000	1	----	F1	1	1
41359	054E	Timer 31 Dropout Delay	0	1000	1	----	F1	1	1
41360	054F	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41364	0553	Reserved	-----	-----	-----	-----	-----	-----	1
41365	0554	Timer 32 Type	0	4	0	----	FC141	0	1
41366	0555	Timer 32 Pickup Delay	0	1000	1	----	F1	1	1
41367	0556	Timer 32 Dropout Delay	0	1000	1	----	F1	1	1
41368	0557	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41374	055D	Reserved	-----	-----	-----	-----	-----	-----	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 28 of 39 Pages)

<u>MODBUS</u>	<u>HEX</u>	<u>DESCRIPTION</u>	<u>MIN</u>	<u>MAX</u>	<u>STEP</u>	<u>UNITS</u>	<u>FORMAT</u>	<u>DEFAULT</u>	<u>SIZE IN WORDS</u>
<b>CONTACT INPUT ASSIGNMENT</b>									
41375	055E	Access Switch	0	57344	0	----	FC142	0	1
41376	055F	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41393	0570	Reserved	-----	-----	-----	-----	-----	-----	1
41394	0571	Process Interlock A	0	57344	0	----	FC142	0	1
41395	0572	Process Interlock B	0	57344	0	----	FC142	0	1
41396	0573	Process Interlock C	0	57344	0	----	FC142	0	1
41397	0574	Process Interlock D	0	57344	0	----	FC142	0	1
41398	0575	Process Interlock AE	0	57344	0	----	FC142	0	1
41399	0576	Process Interlock F	0	57344	0	----	FC142	0	1
41400	0577	Process Interlock G	0	57344	0	----	FC142	0	1
41401	0578	Process Interlock H	0	57344	0	----	FC142	0	1
41402	0579	Process Interlock I	0	57344	0	----	FC142	0	1
41403	057A	Process Interlock J	0	57344	0	----	FC142	0	1
41404	057B	S2C Aux Cont	0	57344	0	----	FC142	0	1
41405	057C	S2O Aux Cont	0	57344	0	----	FC142	0	1
41406	057D	S1C Aux Cont	0	57344	0	----	FC142	0	1
41407	057E	S1O Aux Cont	0	57344	0	----	FC142	0	1
41408	057F	Disconnect Switch	0	57344	0	----	FC142	0	1
41409	0580	Test with Load	0	57344	0	----	FC142	0	1
41410	0581	Inhibit Xfer to S2	0	57344	0	----	FC142	0	1
41411	0582	Inhibit Xfer to S1	0	57344	0	----	FC142	0	1
41412	0583	Load Shed from S2	0	57344	0	----	FC142	0	1
41413	0584	Reserved	-----	-----	-----	-----	-----	-----	1
41414	0585	Engine Start	0	57344	0	----	FC142	0	1
41415	0586	Manual Xfer S1	0	57344	0	----	FC142	0	1
41416	0587	Commit Xfer to S2	0	57344	0	----	FC142	0	1
41417	0588	Manual Xfer S2-S1	0	57344	0	----	FC142	0	1
41418	0589	Preferred Source Select	0	57344	0	----	FC142	0	1
41419	058A	Transition Mode Select	0	57344	0	----	FC142	0	1
41420	058B	Test Without Load	0	57344	0	----	FC142	0	1
41421	058C	Manual Xfer to S2	0	57344	0	----	FC142	0	1
41422	058D	Manual Xfer to S1	0	57344	0	----	FC142	0	1
41423	058E	Bypass Xfer Time Delay to S1	0	57344	0	----	FC142	0	1
41424	058F	Bypass Xfer Time Delay to S2	0	57344	0	----	FC142	0	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 29 of 39 Pages)

<b>MODBUS</b>	<b>HEX</b>	<b>DESCRIPTION</b>	<b>MIN</b>	<b>MAX</b>	<b>STEP</b>	<b>UNITS</b>	<b>FORMAT</b>	<b>DEFAULT</b>	<b>SIZE IN WORDS</b>
<b>CONTACT INPUT ASSIGNMENT—Cont'd</b>									
41425	0590	Auto Load Shed Reset	0	57344	0	----	FC142	0	1
41426	0591	Auto Xfer Rly	0	57344	0	----	FC142	0	1
41427	0592	S1 Breaker Lockout	0	57344	0	----	FC142	0	1
41428	0593	S2 Breaker Lockout	0	57344	0	----	FC142	0	1
41429	0594	S1 Breaker Racked Out	0	57344	0	----	FC142	0	1
41430	0595	S2 Breaker Racked Out	0	57344	0	----	FC142	0	1
41431	0596	CB Light Test	0	57344	0	----	FC142	0	1
41432	0597	CB Reset	0	57344	0	----	FC142	0	1
41433	0598	Auto Load Shed Bypass	0	57344	0	----	FC142	0	1
41434	0599	Remote Vs Local	0	57344	0	----	FC142	0	1
41435	059A	Bypass Connected to S2	0	57344	0	----	FC142	0	1
41436	059B	Bypass Connected to S1	0	57344	0	----	FC142	0	1
41437	059C	ATS Isolated	0	57344	0	----	FC142	0	1
41438	059D	CB 86 Input	0	57344	0	----	FC142	0	1
41439	059E	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41470	05BD	Reserved	-----	-----	-----	-----	-----	-----	1
<b>SELF TEST</b>									
41471	05BE	Self Test Action	0	1	1	----	FC111	0	1
41472	05BF	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41475	05C2	Reserved	-----	-----	-----	-----	-----	-----	1
<b>LEDs</b>									
41476	05C3	Reserved	-----	-----	-----	-----	-----	-----	1
41477	05C4	Green LED Intensity	0	15	1	----	FC147	0	1
41478	05C5	Red LED Intensity	0	15	1	----	FC147	0	1
41479	05C6	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41514	05E9	Reserved	-----	-----	-----	-----	-----	-----	1
<b>CONTACT OUTPUTS</b>									
41515	05EA	Contact Output 1	0	57344	0	----	FC142	0	1
41516	05EB	Contact Output 2	0	57344	0	----	FC142	0	1
41517	05EC	Contact Output 3	0	57344	0	----	FC142	0	1
41518	05ED	Contact Output 4	0	57344	0	----	FC142	0	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41543	0606	Contact Output 29	0	57344	0	----	FC142	0	1
41544	0607	Contact Output 20	0	57344	0	----	FC142	0	1
41545	0608	Contact Output 31	0	57344	0	----	FC142	0	1
41546	0609	Contact Output 32	0	57344	0	----	FC142	0	1
41547	060A	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
41696	069F	Reserved	-----	-----	-----	-----	-----	-----	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 30 of 39 Pages)

MODBUS	HEX	DESCRIPTION	MIN	MAX	STEP	UNITS	FORMAT	DEFAULT	SIZE IN WORDS
FLEXLOGIC EQUATION									
41697	06A0	Flex Equation	0	65535	1		FC142	1024	51
42209	08A0	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
43118	0C2D	Reserved	-----	-----	-----	-----	-----	-----	1
ATS									
43119	0C2E	Switch Option	0	2	1	-----	FC325	1	1
43120	0C2F	Auto / Manual Select	0	3	1	-----	FC317	0	1
43121	0C30	Load Control 1 (LC1) Type	0	2	1	-----	FC399	0	1
43122	0C31	Load Control 2 (LC2) Type	0	2	1	-----	FC399	0	1
43123	0C32	Load Control 3 (LC3) Type	0	2	1	-----	FC399	0	1
43124	0C33	Load Control 4 (LC4) Type	0	2	1	-----	FC399	0	1
43125	0C34	Load Control 5 (LC5) Type	0	2	1	-----	FC399	0	1
43126	0C35	Load Control 6 (LC6) Type	0	2	1	-----	FC399	0	1
43127	0C36	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
43133	0C3C	Reserved	-----	-----	-----	-----	-----	-----	1
43134	0C3D	Local Loadshed Capable 1	0	1	0		FC329	0	1
43135	0C3E	ATS Amps	0	13	1	A	FC331	0	1
43136	0C3F	CTAP	0	1	0	-----	FC329	0	1
43137	0C40	ATS Name	0	10	1	-----	FC22	22	10
43147	0C4A	ATS Number of Poles	0	2	0	-----	FC197	0	1
43148	0C4B	ATS Type	0	7	1	-----	FC159	0	1
43149	0C4C	ATS Voltage	0	14	1	V	FC333	0	1
43150	0C4D	S1 # of Phases	1	2	1	-----	FC312	0	1
43151	0C4E	S1 Type	1	2	1	-----	FC313	0	1
43152	0C4F	S2 Number of Phases	1	2	1	-----	FC312	0	1
43153	0C50	S2 Type	1	2	1	-----	FC313	0	1
43154	0C51	Solenoid Pulse	0	3000	0	ms	F1	100	1
43155	0C52	Reserved	-----	-----	-----	-----	-----	-----	1
43156	0C53	Coil Control Delay Timer Value	0	3600	1	-----	F24	0	1
43157	0C54	CT Parallel Timer Value	0	20	1	10ms	F1	0	1
43158	0C55	Reserved	-----	-----	-----	-----	-----	-----	1
43159	0C56	Open Last Close Time	0	3600	1	-----	F24	100	1
43160	0C57	Sol Saver Time Value 1	1	3600	1	-----	F24	3	1
43161	0C58	Source Qual. Time	1	3600	0	-----	F24	20	1
43162	0C59	Sync. Timer Value 0 3600	0	3600	1	-----	F24	10	1
43163	0C5A	CT Voltage Differential Limit	0	20	1	%	F1	5	1
43164	0C5B	Reserved	-----	-----	-----	-----	-----	-----	1
43165	0C5C	Reserved	-----	-----	-----	-----	-----	-----	1
43166	0C5D	Reserved	-----	-----	-----	-----	-----	-----	1
43167	0C5E	Reserved	-----	-----	-----	-----	-----	-----	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 31 of 39 Pages)

<u>MODBUS</u>	<u>HEX</u>	<u>DESCRIPTION</u>	<u>MIN</u>	<u>MAX</u>	<u>STEP</u>	<u>UNITS</u>	<u>FORMAT</u>	<u>DEFAULT</u>	<u>SIZE IN WORDS</u>
AST CONTROL									
43168	0C5F	Preferred Source	0	1	1	----	FC161	0	1
43169	0C60	Commit Xfer to S2	0	1	1	----	FC126	0	1
43170	0C61	Transition Mode Select	0	1	1	----	FC117	0	1
43171	0C62	Auto Mode Shed Mode	0	1	1	----	FC326	0	1
43172	0C63	Auto Mode Shed kW Bypass	0	1	1	----	FC126	0	1
43173	0C64	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
43178	0C69	Reserved	-----	-----	-----	-----	-----	-----	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 32 of 39 Pages)

<b>MODBUS</b>	<b>HEX</b>	<b>DESCRIPTION</b>	<b>MIN</b>	<b>MAX</b>	<b>STEP</b>	<b>UNITS</b>	<b>FORMAT</b>	<b>DEFAULT</b>	<b>SIZE IN WORDS</b>
<b>ATS CONTROL TIMER</b>									
43179	0C6A	Time Delay to Preferred Source	0	600	1	----	F24	3	1
43180	0C6B	Time Delay to Alternate Source	0	600	1	----	F24	3	1
43181	0C6C	Gen Run Timer Value	0	3600	1	----	F24	0	1
43182	0C6D	Time Delay for Gen Sag	0	30	1	----	F24	0	1
43183	0C6E	Delay for Generator Start	0	15541	1	----	F24	3	1
43184	0C6F	S2 Failure Response Delay	0	15540	1	----	F24	3	1
43185	0C70	Time Delay to Preferred Source	0	15540	1	----	F24	1800	1
43186	0C71	Reserved	----	----	----	----	----	----	1
43187	0C72	Delay for Engine Cooldown	0	3600	1	----	F24	300	1
43188	0C73	Time Delay to Engine Cooldown Timer Value	0	3600	1	----	F24	600	1
43189	0C74	Time Delay to Alternate Source	0	15540	1	----	F24	3	1
43190	0C75	Pre Load Control 1 (LC1) Timer	0	3600	1	----	F24	0	1
43191	0C76	Pre Load Control 2 (LC2) Timer	0	3600	1	----	F24	0	1
43192	0C77	Pre Load Control 3 (LC3) Timer	0	3600	1	----	F24	0	1
43193	0C78	Pre Load Control 4 (LC4) Timer	0	3600	1	----	F24	0	1
43194	0C79	Pre Load Control 5 (LC5) Timer	0	3600	1	----	F24	0	1
43195	0C7A	Pre Load Control 6 (LC6) Timer	0	3600	1	----	F24	0	1
43196	0C7B	Post Load Control 1 (LC1) Timer	0	3600	1	----	F24	0	1
43197	0C7C	Post Load Control 2 (LC2) Timer	0	3600	1	----	F24	0	1
43198	0C7D	Post Load Control 3 (LC3) Timer	0	3600	1	----	F24	0	1
43199	0C7E	Post Load Control 4 (LC4) Timer	0	3600	1	----	F24	0	1
43200	0C7F	Post Load Control 5 (LC5) Timer	0	3600	1	----	F24	0	1
43201	0C80	Post Load Control 6 (LC6) Timer	0	3600	1	----	F24	0	1
43202	0C81	Utility Sag Timer	20	3000	1	10ms	F1	0	1
43203	0C82	Reserved	----	----	----	----	----	----	1
to			----	----	----	----	----	----	----
43207	0C86 1	Reserved	----	----	----	----	----	----	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 33 of 39 Pages)

<b>MODBUS</b>	<b>HEX</b>	<b>DESCRIPTION</b>	<b>MIN</b>	<b>MAX</b>	<b>STEP</b>	<b>UNITS</b>	<b>FORMAT</b>	<b>DEFAULT</b>	<b>SIZE IN WORDS</b>
<b>ATS R50</b>									
43208	0C87	Max Frequency Difference	0	500	1	Hz	F3	500	1
43209	0C88	Sync Phase Angle	0	21	1	*	F1*	10	1
43210	0C89	Fail to Sync Timer	60	1800	1	S	F18	180	1
43211	0C8A	Slip Rate	0	20	1	Hz	F3	20	1
43212	0C8B	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
43233	0CA0	Reserved	-----	-----	-----	-----	-----	-----	1
<b>ATS SOURCE #1 CONFIGURATION</b>									
43234	0CA1	S1 Overfreq Fail	501	699	1	Hz	F2*	699	1
43235	0CA2	S1 Overfreq Restore	500	697	1	Hz	F2	629	1
43236	0CA3	S1 OverVolt Fail	102	111	1	%	F1*	111	1
43237	0CA4	S1 OverVolt Restore	103	108	1	%	F1	105	1
43238	0CA5	S1 Underfreq Fail	450	599	1	Hz	F2	590	1
43239	0CA6	S1 Underfreq Restore	451	600	1	Hz	F2	595	1
43240	0CA7	S1 UnderVolt Fail	70	98	1	%	F1	80	1
43241	0CA8	S1 UnderVolt Restore	72	100	1	%	F1	90	1
43242	0CA9	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
43252	0CB3	Reserved	-----	-----	-----	-----	-----	-----	1
<b>ATS SOURCE #2 CONFIGURATION</b>									
43253	0CB4	S2 Auto LS Underfreq Set	450	601	1	Hz	F2*	601	1
43254	0CB5	S2 Auto LS Underfreq Delay	0	3600	1	S	F24	0	1
43255	0CB6	S2 Auto LS Overpower Set	50	111	1	%	F1*	111	1
43256	0CB7	S2 Auto LS Overpower Delay	0	3600	1	S	F24	0	1
43257	0CB8	S2 Auto LS UnderVolt Set	0	101	1	%	F1*	101	1
43258	0CB9	S2 Auto LS UnderVolt Delay	0	3600	1	S	F24	0	1
43259	0CBA	S2 Overfreq Fail	501	699	1	Hz	F2*	699	1
43260	0CBB	S2 Overfreq Restore	500	697	1	Hz	F2	697	1
43261	0CBC	S2 OverVolt Fail	102	111	1	%	F1*	111	1
43262	0CBD	S2 OverVolt Restore	100	108	1	%	F1	105	1
43263	0CBE	S2 Underfreq Fail	450	599	1	Hz	F2	540	1
43264	0CBF	S2 Underfreq Restore	451	600	1	Hz	F2	570	1
43265	0CC0	S2 UnderVolt Fail	70	98	1	%	F1	80	1
43266	0CC1	S2 UnderVolt Restore	72	100	1	%	F1	90	1
43267	0CC2	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
43275	0CCA	Reserved	-----	-----	-----	-----	-----	-----	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 34 of 39 Pages)

<b>MODBUS</b>	<b>HEX</b>	<b>DESCRIPTION</b>	<b>MIN</b>	<b>MAX</b>	<b>STEP</b>	<b>UNITS</b>	<b>FORMAT</b>	<b>DEFAULT</b>	<b>SIZE IN WORDS</b>
<b>VOLTAGE IMBALANCE</b>									
43276	0CCB	Phase Rotation Match	0	1	1	----	FC126	0	1
43277	0CCC	Voltage Imbalance Failure	50	21	1	%	F1*	21	1
43278	0CCD	Voltage Imbalance Restore	3	18	1	%	F1	8	1
43279	0CCE	Voltage Alarm Delay	10	30	1	s	F1	30	1
43280	0CCF	Reserved	-----	-----	-----	-----	-----	-----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
43285	0CD4	Reserved	-----	-----	-----	-----	-----	-----	1
<b>ATS EXERCISER</b>									
43286	0CD5	Exerciser Type	0	5	1	----	FC163	0	1
43287	0CD6	CDT Event 1 Start Time	0	0X173B3B63	1	----	F19	0	2
43289	0CD8	CDT Event 1 Duration	0	3600	1	----	F24	0	1
43290	0CD9	CDT Event 1 Wkday	0	7	1	----	FC171	0	1
43291	0CDA	CDT Event 1 Date 2	0	0X0C1F082E	1	----	FC316	0	2
43293	0CDC	CDT Event 1 Load	0	1	1	----	FC303	0	1
43294	0CDD	CDT Event 2 Start Time	0	0X173B3B63	1	----	F19	0	2
43296	0CDF	CDT Event 2 Duration	0	3600	1	----	F24	0	1
43297	0CE0	CDT Event 2 Wkday	0	7	1	----	FC171	0	1
43298	0CE1	CDT Event 2 Date	0	0X0C1F082E	1	----	FC316	0	2
43300	0CE3	CDT Event 2 Load	0	1	1	----	FC303	0	1
43301	0CE4	CDT Event 3 Start Time	0	0X173B3B63	1	----	F19	0	2
43303	0CE6	CDT Event 3 Duration	0	3600	1	----	F24	0	1
43304	0CE7	CDT Event 3 Wkday	0	7	1	----	FC171	0	1
43305	0CE8	CDT Event 3 Date	0	0X0C1F082E	1	----	FC316	0	2
43307	0CEA	CDT Event 3 Load	0	1	1	----	FC303	0	1
43308	0CEB	CDT Event 4 Start Time	0	0X173B3B63	1	----	F19	0	2
43310	0CED	CDT Event 4 Duration	0	3600	1	----	F24	0	1
43311	0CEE	CDT Event 4 Wkday	0	7	1	----	FC171	0	1
43312	0CEF	CDT Event 4 Date	0	0X0C1F082E	1	----	FC316	0	2
43314	0CF1	CDT Event 4 Load	0	1	1	----	FC303	0	1



TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 35 of 39 Pages)

<b>MODBUS</b>	<b>HEX</b>	<b>DESCRIPTION</b>	<b>MIN</b>	<b>MAX</b>	<b>STEP</b>	<b>UNITS</b>	<b>FORMAT</b>	<b>DEFAULT</b>	<b>SIZE IN WORDS</b>
<b>ATS EXERCISER---Cont'd</b>									
43315	0CF2	CDT Event 5 Start Time	0	0X173B3B63	1	----	F19	0	2
43317	0CF4	CDT Event 5 Duration	0	3600	1	----	F24	0	1
43318	0CF5	CDT Event 5 Wkday	0	7	1	----	FC171	0	1
43319	0CF6	CDT Event 5 Date	0	0X0C1F082E	1	----	FC316	0	2
43321	0CF8	CDT Event 5 Load	0	1	1	----	FC303	0	1
43322	0CF9	CDT Event 6 Start Time	0	0X173B3B63	1	----	F19	0	2
43324	0CFB	CDT Event 6 Duration	0	3600	1	----	F24	0	1
43325	0CFC	CDT Event 6 Wkday	0	7	1	----	FC171	0	1
43326	0CFD	CDT Event 6 Date	0	0X0C1F082E	1	----	FC316	0	2
43328	0CFF	CDT Event 6 Load	0	1	1	----	FC303	0	1
43329	0D00	CDT Event 7 Start Time	0	0X173B3B63	1	----	F19	0	2
43331	0D02	CDT Event 7 Duration	0	3600	1	----	F24	0	1
43332	0D03	CDT Event 7 Wkday	0	7	1	----	FC171	0	1
43333	0D04	CDT Event 7 Date	0	0X0C1F082E	1	----	FC316	0	2
43335	0D06	CDT Event 7 Load	0	1	1	----	FC303	0	1
43336	0D07	CDT Event 8 Start Time	0	0X173B3B63	1	----	F19	0	2
43338	0D09	CDT Event 8 Duration	0	3600	1	----	F24	0	1
43339	0D0A	Reserved	----	----	----	----	----	----	1
43340	0D0B	CDT Event 8 Date	0	0X0C1F082E	1	----	FC316	0	2
43342	0D0D	CDT Event 8 Load	0	1	1	----	FC303	0	1
43343	0D0E	CDT Event 9 Start Time	0	0X173B3B63	1	----	F19	0	2
43345	0D10	CDT Event 9 Duration	0	3600	1	----	F24	0	1
43346	0D11	Reserved	----	----	----	----	----	----	1
43347	0D12	CDT Event 9 Date	0	0X0C1F082E	1	----	FC316	0	2
43349	0D14	CDT Event 9 Load	0	1	1	----	FC303	0	1
43350	0D15	CDT Event 10 Start Time	0	0X173B3B63	1	----	F19	0	2
43352	0D17	CDT Event 10 Duration	0	3600	1	----	F24	0	1
43353	0D18	Reserved	----	----	----	----	----	----	1
43354	0D19	CDT Event 10 Date	0	0X0C1F082E	1	----	FC316	0	2
43356	0D1B	CDT Event 10 Load	0	1	1	----	FC303	0	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 36 of 39 Pages)

<u>MODBUS</u>	<u>HEX</u>	<u>DESCRIPTION</u>	<u>MIN</u>	<u>MAX</u>	<u>STEP</u>	<u>UNITS</u>	<u>FORMAT</u>	<u>DEFAULT</u>	<u>SIZE IN WORDS</u>
ATS EXERCISER---Cont'd									
43357	0D1C	CDT Event 11 Start Time	0	0X173B3B63	1	----	F19	0	2
43359	0D1E	CDT Event 11 Duration	0	3600	1	----	F24	0	1
43360	0D1F	Reserved	----	----	----	----	----	----	1
43361	0D20	CDT Event 11 Date	0	0X0C1F082E	1	----	FC316	0	2
43363	0D22	CDT Event 11 Load	0	1	1	----	FC303	0	1
43364	0D23	CDT Event 12 Start Time	0	0X173B3B63	1	----	F19	0	2
43366	0D25	CDT Event 12 Duration	0	3600	1	----	F24	0	1
43367	0D26	Reserved	----	----	----	----	----	----	1
43368	0D27	CDT Event 12 Date	0	0X0C1F082E	1	----	FC316	0	2
43370	0D29	CDT Event 12 Load	0	1	1	----	FC303	0	1
43371	0D2A	CDT Event 13 Start Time	0	0X173B3B63	1	----	F19	0	2
43373	0D2C	CDT Event 13 Duration	0	3600	1	----	F24	0	1
43374	0D2D	Reserved	----	----	----	----	----	----	1
43375	0D2E	CDT Event 13 Date	0	0X0C1F082E	1	----	FC316	0	2
43377	0D30	CDT Event 13 Load	0	1	1	----	FC303	0	1
43378	0D31	CDT Event 14 Start Time	0	0X173B3B63	1	----	F19	0	2
43380	0D33	CDT Event 14 Duration	0	3600	1	----	F24	0	1
43381	0D34	Reserved	----	----	----	----	----	----	1
43382	0D35	CDT Event 14 Date	0	0X0C1F082E	1	----	FC316	0	2
43384	0D37	CDT Event 14 Load	0	1	1	----	FC303	0	1
43385	0D38	CDT Event 15 Start Time	0	0X173B3B63	1	----	F19	0	2
43387	0D3A	CDT Event 15 Duration	0	3600	1	----	F24	0	1
43388	0D3B	Reserved	----	----	----	----	----	----	1
43389	0D3C	CDT Event 15 Date	0	0X0C1F082E	1	----	FC316	0	2
43391	0D3E	CDT Event 15 Load	0	1	1	----	FC303	0	1
43392	0D3F	CDT Event 16 Start Time	0	0X173B3B63	1	----	F19	0	2
43394	0D41	CDT Event 16 Duration	0	3600	1	----	F24	0	1
43395	0D42	Reserved	----	----	----	----	----	----	1
43396	0D43	CDT Event 16 Date	0	0X0C1F082E	1	----	FC316	0	2
43398	0D45	CDT Event 16 Load	0	1	1	----	FC303	0	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 37 of 39 Pages)

<u>MODBUS</u>	<u>HEX</u>	<u>DESCRIPTION</u>	<u>MIN</u>	<u>MAX</u>	<u>STEP</u>	<u>UNITS</u>	<u>FORMAT</u>	<u>DEFAULT</u>	<u>SIZE IN WORDS</u>
ATS EXERCISER---Cont'd									
43399	0D46	CDT Event 17 Start Time	0	0X173B3B63	1	----	F19	0	2
43401	0D48	CDT Event 17 Duration	0	3600	1	----	F24	0	1
43402	0D49	Reserved	----	----	----	----	----	----	1
43403	0D4A	CDT Event 17 Date	0	0X0C1F082E	1	----	FC316	0	2
43405	0D4C	CDT Event 17 Load	0	1	1	----	FC303	0	1
43406	0D4D	CDT Event 18 Start Time	0	0X173B3B63	1	----	F19	0	2
43408	0D4F	CDT Event 18 Duration	0	3600	1	----	F24	0	1
43409	0D50	Reserved	----	----	----	----	----	----	1
43410	0D51	CDT Event 18 Date	0	0X0C1F082E	1	----	FC316	0	2
43412	0D53	CDT Event 18 Load	0	1	1	----	FC303	0	1
43413	0D54	CDT Event 19 Start Time	0	0X173B3B63	1	----	F19	0	2
43415	0D56	CDT Event 19 Duration	0	3600	1	----	F24	0	1
43416	0D57	Reserved	----	----	----	----	----	----	1
43417	0D58	CDT Event 19 Date	0	0X0C1F082E	1	----	FC316	0	2
43419	0D5A	CDT Event 19 Load	0	1	1	----	FC303	0	1
43420	0D5B	CDT Event 20 Start Time	0	0X173B3B63	1	----	F19	0	2
43422	0D5D	CDT Event 20 Duration	0	3600	1	----	F24	0	1
43423	0D5E	Reserved	----	----	----	----	----	----	1
43424	0D5F	CDT Event 20 Date	0	0X0C1F082E	1	----	FC316	0	2
43426	0D61	CDT Event 20 Load	0	1	1	----	FC303	0	1
43427	0D62	CDT Event 21 Start Time	0	0X173B3B63	1	----	F19	0	2
43429	0D64	CDT Event 21 Duration	0	3600	1	----	F24	0	1
43430	0D65	Reserved	----	----	----	----	----	----	1
43431	0D66	CDT Event 21 Date	0	0X0C1F082E	1	----	FC316	0	2
43433	0D68	CDT Event 21 Load	0	1	1	----	FC303	0	1
43434	0D69	CDT Event 22 Start Time	0	0X173B3B63	1	----	F19	0	2
43436	0D6B	CDT Event 22 Duration	0	3600	1	----	F24	0	1
43437	0D6C	Reserved	----	----	----	----	----	----	1
43438	0D6D	CDT Event 22 Date	0	0X0C1F082E	1	----	FC316	0	2
43440	0D6F	CDT Event 22 Load	0	1	1	----	FC303	0	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 38 of 39 Pages)

<u>MODBUS</u>	<u>HEX</u>	<u>DESCRIPTION</u>	<u>MIN</u>	<u>MAX</u>	<u>STEP</u>	<u>UNITS</u>	<u>FORMAT</u>	<u>DEFAULT</u>	<u>SIZE IN WORDS</u>
ATS EXERCISER---Cont'd									
43441	0D70	CDT Event 23 Start Time	0	0X173B3B63	1	----	F19	0	2
43443	0D72	CDT Event 23 Duration	0	3600	1	----	F24	0	1
43444	0D73	Reserved	----	----	----	----	----	----	1
43445	0D74	CDT Event 23 Date	0	0X0C1F082E	1	----	FC316	0	2
43447	0D76	CDT Event 23 Load	0	1	1	----	FC303	0	1
43448	0D77	CDT Event 24 Start Time	0	0X173B3B63	1	----	F19	0	2
43450	0D79	CDT Event 24 Duration	0	3600	1	----	F24	0	1
43451	0D7A	Reserved	----	----	----	----	----	----	1
43452	0D7B	CDT Event 24 Date	0	0X0C1F082E	1	----	FC316	0	2
43454	0D7D	CDT Event 24 Load	0	1	1	----	FC303	0	1
43455	0D7E	Reserved	----	----	----	----	----	----	1
to	to	-----	-----	-----	-----	-----	-----	-----	-----
43462	0D85	Reserved	----	----	----	----	----	----	1

TABLE 3.2.5.1.1 MODBUS MEMORY MAP (Page 39 of 39 Pages)

<u>MODBUS</u>	<u>HEX</u>	<u>DESCRIPTION</u>	<u>MIN</u>	<u>MAX</u>	<u>STEP</u>	<u>UNITS</u>	<u>FORMAT</u>	<u>DEFAULT</u>	<u>SIZE IN WORDS</u>
ANALOG ALARM SETTINGS									
43463	0D86	Voltage THD Alarm Level	1	1001	1	%	F2*	1001	1
43464	0D87	Voltage THD Alarm Delay	0	65535	1	s	F1	0	1
43465	0D88	Current THD Alarm Level	1	1001	1	%	F2*	1001	1
43466	0D89	Current THD Alarm Delay	0	65535	1	s	F1	0	1
43467	0D8A	Low PF Lag Alarm Level	0	100	1	----	F3*	100	1
43468	0D8B	Low PF Alarm Delay	0	65535	1	s	F1	0	1
43470	D8D	Overpower Alarm Delay	0	65535	1	s	F1	0	1
43471	0D8E	Phase A Overcurrent Level	1	201	1	%flA	F1*	201	1
43472	0D8F	Phase A Overcurrent Delay	0	65535	1	s	F1	0	1
43473	0D90	Phase B Overcurrent Level	1	201	1	%flA	F1*	201	1
43474	0D91	Phase B Overcurrent Delay	0	65535	1	s	F1	0	1
43475	0D92	Phase C Overcurrent Level	1	201	1	%flA	F1*	201	1
43476	0D93	Phase C Overcurrent Delay	0	65535	1	s	F1	0	1
43477	0D94	Neutral Overcurrent Level	1	201	1	%flA	F1*	201	1
43478	0D95	Neutral Overcurrent Delay	0	65535	1	s	F1	0	1
43479	0D96	Low PF Lead Alarm Level	0	100	1	----	F3 <sup>1</sup>	100	1
43480	0D97	Overpower Alarm Level	1	2000000001	1	kW	F10	2000000001	1

### 3.2.6 Format Codes

#### 3.2.6.1 General

3.2.6.1.1 Table 3.2.6.1.1 (19 pages) provides shows the RPTCS Format Codes and their definitions.

**3.2.6.1.1.1 NOTE** Not all codes are applicable to every type of switch.

Table 3.2.6.1.1 Format Code Definitions (Page 1 of 19 Pages)

<b><u>FORMAT CODE</u></b>	<b><u>TYPE</u></b>	<b><u>FORMAT CODE DEFINITION</u></b>	<b><u>SUB-CODE.</u></b>	<b><u>SUB-CODE DEFINITION &amp; EXAMPLES</u></b>
F1	16 Bits	UNSIGNED VALUE	----	Example: 1234 stored as 1234
F2	16 Bits	UNSIGNED VALUE, 1 DECIMAL PLACE	----	Example: 123.4 stored as 1234
F3	16 Bits	UNSIGNED VALUE, 2 DECIMAL PLACES	----	Example: 12.34 stored as 1234
F4	16 Bits	2'S COMPLEMENT SIGNED VALUE	----	Example: -1234 stored as -1234, i.e. 64302
F6	16 Bits	2'S COMPLEMENT SIGNED VALUE, 2 DECIMAL PLACES	----	Example: --12.34 stored as -12.34, i.e. 64302
F9	32 Bits	UNSIGNED LONG VALUE	1st 16 bits	High Order Word of Long Value
			2nd 16 bits	Low Order Word of Long Value
F10	32 Bits	UNSIGNED LONG VALUE, 1 DECIMAL PLACE	1st 16 bits	High Order Word of Long Value
			2nd 16 bits	Low Order Word of Long Value
				Example: 12345.6 stored as 123456; i.e. 1st word: 0001 hex, 2nd word: E240 hex
F13	32 Bits	2's COMPLEMENT SIGNED LONG VALUE, 1 DECIMAL PLACE	1st 16 bits	High Order Word of Long Value
			2nd 16 bits	Low Order Word of Long Value
				Example: -12345.6 stored as -123456; i.e. 1st word: FFFE hex, 2nd word: 1DC0 hex
F15	16 Bits	HARDWARE REVISION	0	Prototype
			1	A
			2	B
			3	C
			4	D
			5	E
			6	F
			7	G
			8	H
			9	I
			10	J
			11	K
			12	L
			13	M
			14	N
			15	O
			16	P
			17	Q
			18	R
			19	S
			20	T
			21	U
			22	V
			23	W
			24	X
			25	Y
			26	Z
F16	16 Bits	2's COMPLEMENT SIGNED VALUE, 1 DECIMAL PLACE	<0	S2 Leads S1
			>0	S1 Leads S2
F17	32 Bits	UNSIGNED LONG VALUE, 3 DECIMAL PLACES	1st 16 bits	High Order Word of Long Value
			2nd 16 bits	Low Order Word of Long Value
				Example: 123456 stored as 123456; i.e. 1st word: 0001 hex, 2nd word: E240 hex

TABLE 3.2.6.1.1 FORMAT CODE DEFINITIONS (Page 2 of 19 Pages)

<b>FORMAT CODE</b>	<b>TYPE</b>	<b>FORMAT CODE DEFINITION</b>	<b>SUB-CODE</b>	<b>SUB-CODE DEFINITION &amp; EXAMPLES</b>
F18	32 Bits	DATE MM/DD/YYYY	1st byte	Month 1 to 12
			2nd byte	Day 1 to 31
			3rd and 4th byte	Year 1995 to 2094
				Example: Feb 20, 1995 stored as 34867147; i.e. 1st word: 0214, 2nd word 07CB
F19	32 Bits	TIME HH:MM:SS:hh	1st byte	Hours 0 to 23
			2nd byte	Minutes 0 to 59
			3rd byte	Seconds 0 to 59
			4th byte	Hundredths of seconds 0 to 99
				Example: 2:05pm stored as 235208704; .e. 1st word: 0E05, 2nd word 0000
F21	16 Bits	2's COMPLEMENT SIGNED VALUE, 2 DECIMAL PLACES Power Factor	<0	Leading Power Factor - Negative
			>0	Lagging Power Factor - Positive
				Example: Power Factor of 0.87 lag is used as 87; i.e. 0057
F22	16 Bits	TWO 8-BIT CHARACTERS PACKED INTO 16-BIT UNSIGNED	MSB	First Character
			LSB	Second Character
				Example: String 'AB' stored as 4142 hex
F24	16 Bits	UNSIGNED VALUE AS SECONDS SHOW AS Duration, MAX VALUE = OFF		Example: 1234 stored as 1234, and displayed as 20 Mins
F25	16 Bits	Trace Memory Channel Data	0	Leading
			1	Lagging
F26	16 Bits	Trace Memory Channel Data	0	Va
			1	Vb
			2	Vc
			3	Va2
			4	Vb2
			5	Vc2
			6	Ia
			7	Ib
			8	Ic
			9	Ig
			10	Inputs 1 to 16
			11	Outputs 1 to 16
F27	32 Bits	UNSIGNED LONG VALUE AS MINUTES SHOW AS LongHoursMinutes		Example: 1234 stored as 1234, and displayed as 20
F74	16 Bits	Data Logger Sample Rate	0	1 Cycle
			1	1 Second
			2	1 Minute
			3	1 Hour
F75	16 Bits	Data Logger Status	0	Stopped
			1	Started
			2	Triggered
			3	Pre-Trigger
			4	Post-Trigger



TABLE 3.2.6.1.1 FORMAT CODE DEFINITIONS (Page 3 of 19 Pages)

<b><u>FORMAT CODE</u></b>	<b><u>TYPE</u></b>	<b><u>FORMAT CODE DEFINITION</u></b>	<b><u>SUB-CODE.</u></b>	<b><u>SUB-CODE DEFINITION &amp; EXAMPLES</u></b>
F77	16 Bits	Data Logger Channel Data	0	Disabled
			1	Phase A Current
			2	Phase B Current
			3	Phase C Current
			4	Average Phase Current
			5	Current THD
			6	Current Unbalance
			7	Neutral Current
			8	System Frequency
			9	Vab
			10	Vbc
			11	Vca
			12	Van
			13	Vbn
			14	Vcn
			15	Power Factor
			16	Real Power (kW)
			17	Reactive Power (kVAr)
			18	Apparent Power (kVA)
			19	Positive Watthours
			20	Positive VArhours
			21	VabS2
			22	VabS2
			23	VcaS2
			24	VanS2
			25	VbnS2
			26	VcnS2
FC101	16 Bits	RS 485 Baud Rate	0	9600 baud
			1	19200 baud
			2	38400 baud
			3	57600 baud
			4	115200 baud
FC103	16 Bits	Off / On or No / Yes Selection	0	OFF / NO
			1	ON / YES
FC104	16 Bits	Ground CT Type	0	None
			1	1 A Secondary
			2	5 A Secondary
FC106	16 Bits	Voltage Transformer Connection Type	0	Wye
			1	Delta
FC107	16 Bits	Supply Frequency	0	60
			14	50

TABLE 3.2.6.1.1 FORMAT CODE DEFINITIONS (Page 4 of 19 Pages)

<b><u>FORMAT CODE</u></b>	<b><u>TYPE</u></b>	<b><u>FORMAT CODE DEFINITION</u></b>	<b><u>SUB-CODE.</u></b>	<b><u>SUB-CODE DEFINITION &amp; EXAMPLES</u></b>
FC109	16 Bits	Flex Logic Status	0	OK
			1	Unknown Token
			2	Too Many Latches
			3	Too Many Timers
			4	Too Many + OneShots
			5	Too Many – OneShots
			6	Too Many Duel OneShots
			7	Stack Overflow
			8	Stack Underflow
			9	Program Too Long
FC111	16 Bits	Fault Relays	0	Fault
			1	Alarm
FC112	16 Bits	Communication Status	0	Error
			1	OK
FC116	16 Bits	Switch Type	0	Open
			1	ClosedFC117
FC117	16 Bit	LED Flash	Bot 0	Running
			Bot 1	Stopped
			Bot 2	Faulted
			Bot 3	Alarm
			Bot 4	Comms OK
			Bot 5	Auto
			Bot 6	Manual
			Bot 7	USER1
			Bot 8	USER2
			Bot 9	USER3
			Bot 10	50%
			Bot 11	80%
			Bot 12	100%
			Bot 13	Right Top LED
			Bot 14	Right Bottom LED

TABLE 3.2.6.1.1 FORMAT CODE DEFINITIONS (Page 5 of 19 Pages)

<b><u>FORMAT CODE</u></b>	<b><u>TYPE</u></b>	<b><u>FORMAT CODE DEFINITION</u></b>	<b><u>SUB-CODE.</u></b>	<b><u>SUB-CODE DEFINITION &amp; EXAMPLES</u></b>
FC132	16 Bit	Cause of Waveform/Data Log Trigger	0	None
			1	Command
			0xC0	VO 1
			0xC1	VO 2
			0xC2	VO 3
			0xC3	VO 4
			0xC4	VO 5
			0xC5	VO 6
			0xC6	VO 7
			0xC7	VO 8
			0xC8	VO 9
			0xC9	VO 10
			0xCA	VO 11
			0xCB	VO 12
			0xCC	VO 13
			0xCD	VO 14
			0xCE	VO 15
			0xCF	VO 16
			0xD0	VO 17
			0xD1	VO 18
			0xD2	VO 19
			0xD3	VO 20
			0xD4	VO 21
			0xD5	VO 22
			0xD6	VO 23
			0xD7	VO 24
			0xD8	VO 25
			0xD9	VO 26
			0xDA	VO 27
			0xDB	VO 28
			0xDC	VO 29
			0xDD	VO 30
			0xDE	VO 31
			0xDF	VO 32
			0xA002	Any Alarm
FC134	16 Bits	Cause of Event	0	No Event/Fault To Date
			1	Control Power Lost
			2	Control Power Applied
			3	Date or Time Set
			4	Reset
			0x8002	Any Fault
			0x8442	Comm Fail Fault
			0x84C2	Process ILock A Fault
			0x8502	Process ILock B Fault
			0x8542	Process ILock C Fault
			0x8582	Process ILock D Fault
			0x85C2	Process ILock E Fault
			0x8602	Process ILock F Fault
			0x8642	Process ILock G Fault

TABLE 3.2.6.1.1 FORMAT CODE DEFINITIONS (Page 6 of 19 Pages)

<b><u>FORMAT CODE</u></b>	<b><u>TYPE</u></b>	<b><u>FORMAT CODE DEFINITION</u></b>	<b><u>SUB-CODE</u></b>	<b><u>SUB-CODE DEFINITION &amp; EXAMPLES</u></b>
FC134	Continued			
			0x8682	Process ILock H Fault
			0x86C2	Process ILock I Fault
			0x8702	Process ILock J Fault
			0x9A02	ATS Lockout
			0x9A42	S1 Failure to Disconnect
			0x9A82	S2 Failure to Disconnect
			0x9AC2	S1 Failure to Connect
			0x9B02	S2 Failure to Connect
			0x9B42	S1 & S2 Fail to Disconnect
			0x9B82	Phase Rotation Error
			0x9BC2	Sources Out of Phase
			0x9C02	S1 Lmt Sw Not Closed
			0x9C42	S1 Lmt Sw Not Opened
			0x9C82	S2 Lmt Sw Not Closed
			0x9CC2	S2 Lmt Sw Not Opened
			0x9D02	S1 Del Lmt Sw Not Cl
			0x9D42	S1 Del Lmt Sw Not Op
			0x9D82	S2 Del Lmt Sw Not Cl
			0x9DC2	S2 Del Lmt Sw Not Op
			0x9E02	Any Transfer Fault
			0xA002	Any Alarm
			0xA4C2	Process ILock A Alarm
			0xA502	Process ILock B Alarm
			0xA542	Process ILock C Alarm
			0xA582	Process ILock D Alarm
			0xA5C2	Process ILock E Alarm
			0xA602	Process ILock F Alarm
			0xA642	Process ILock G Alarm
			0xA682	Process ILock H Alarm
			0xA6C2	Process ILock I Alarm
			0xA702	Process ILock J Alarm
			0xAC42	Self Test Alarm
			0xAC82	Comm Fail Alarm
			0xB302	ATS Isolated
			0xB342	Bypass ATS on S2
			0xB382	Bypass ATS on S1
			0xB3C2	S1 OK
			0xB402	S2 OK
			0xB442	Voltage Diff > 5%
			0xB482	Low Power Factor
			0xB4C2	Overpower kW
			0xB502	Phase A Overcurrent
			0xB542	Phase B Overcurrent
			0xB582	Phase C Overcurrent
			0xB5C2	Neutral Overcurrent
			0xB602	S1 to S2 Manual Xfer
			0xB642	S2 to S1 Manual Xfer
			0xB682	S1 Volt THD
			0xB6C2	S2 Volt THD
			0xB782	Current THD
			0xB802	CTAP Audible Alarm
			0xB842	S2 Shunt Fault
			0xB882	S1 UnderVoltage
			0xB8C2	S1 OverVoltage
			0xB902	S1 Underfrequency
			0xB942	S1 Overfrequency
			0xB982	S2 UnderVoltage
			0xB9C2	S2 OverVoltage
			0xBA02	S2 Underfrequency

TABLE 3.2.6.1.1 FORMAT CODE DEFINITIONS (Page 7 of 19 Pages)

<b><u>FORMAT CODE</u></b>	<b><u>TYPE</u></b>	<b><u>FORMAT CODE DEFINITION</u></b>	<b><u>SUB-CODE</u></b>	<b><u>SUB-CODE DEFINITION &amp; EXAMPLES</u></b>
FC134	Continued			
			0xBA42	S2 Overfrequency
			0xBA82	S1 Volt Imbalance Alarm
			0xBAC2	S2 Volt Imbalance Alarm
			0xBB02	Inhibited via Disconnect Switch
			0xBB42	Switch Exercising
			0xBB82	Neutral Position
			0xBBC2	Xfer to Alternate Source
			0xBC02	S1 to S2 Auto Xfer Alert
			0xBC42	S2 to S1 Auto Xfer Alert
			0xBC82	S1 to S2 Inhibit
			0xBCC2	S2 to S1 Inhibit
			0xBD02	Engine Start
			0xBD42	Auto Load Shed Active
			0xBD82	Not in Auto
			0xBDC2	S1 Failure
			0xBE02	Alternate Source Fail to Start
			0xBEC2	S1 Connected
			0xBF02	S2 Connected
			0xBE42	S1 Disconnected
			0xBE82	S2 Disconnected
			0xBF42	Freqs Differ > Setting
			0xBF82	Test Initiated
			0xC802	Access Switch Closed
			0xD802	S2 Sgl Operator
			0xD842	S2 Dual Operator
			0xD882	S1 Sgl Operator
			0xD8C2	S1 Dual Operator
			0xD902	Engine Start Signal (Open=ON)
			0xD942	Bypass ATS On S2
			0xD982	Bypass ATS On S1
			0xDA42	Load Control 1
			0xDA82	Load Control 2
			0xDAC2	Load Control 3
			0xDB02	Load Control 4
			0xDB42	Load Control 5
			0xDB82	Load Control 6
			0xDBC2	S2 Set as Pref Source
			0xDC02	S1 CB Fail to Close
			0xDC42	S2 CB Fail to Close
			0xDC82	Remove S1 from RPTCS
			0xDCC2	Remove S2 from RPTCS
			0xDD02	S1 CB Closed
			0xDD42	S1 CB Open
			0xDD82	S1 CB Relay Lockout
			0xDDC2	S2 CB Closed
			0xDE02	S2 CB Open
			0xDE42	S2 CB Relay Lockout
			0xDEC2	S2 Remote Load Shed
			0xDE82	Remote Timer Bypassed
			0xDF02	RPTCS Engine Start

TABLE 3.2.6.1.1 FORMAT CODE DEFINITIONS (Page 8 of 19 Pages)

<b><u>FORMAT CODE</u></b>	<b><u>TYPE</u></b>	<b><u>FORMAT CODE DEFINITION</u></b>	<b><u>SUB-CODE</u></b>	<b><u>SUB-CODE DEFINITION &amp; EXAMPLES</u></b>
FC140	16 Bits	Interlock Function	0	Disabled
			1	Fault
			2	Alarm
FC141	16 Bits	Timer Type	0	Millisecond
			1	Second
			2	Minute
FC142	16 Bits	FlexLogic Bit Field EEETTTTSSSSSS: S-Bits denote the element state or Operator specific data. Number of inputs. T-Bits denote Flex logic Operands and Parameters or when one of the E bits are set they denote specific details for the Element Type E-Bits	0x0000	OFF
			0x0001	ON
			0x0040	Contact Inputs
			0x0080	Virtual Inputs
			0x00C0	Virtual Outputs
			0x01C0	Remote Inputs
			0x0380	Insert
			0x0400	End
			0x0440	NOT
			0x0480	XOR
			0x04C0	LATCH
			0x0500	OR
			0x0540	AND
			0x0580	NOR
			0x05C0	NAND
			0x0600	TIMER
			0x0640	ASSIGN
			0x8000	Fault
			0xA000	Alarm
			0xC000	Control
FC144	32 Bits	LED Status	Bit 0	Alarm Red
			Bit 2	TD Active Red
			Bit 4	Xfer Inhibit Red
			Bit 9	S1 Available Green
			Bit 15	S1 Connected Green
			Bit 26	S2 Available Red
			Bit 28	S2 Connected Red
FC145	16 Bits	Element Status 1	Bit 0	Level
			Bit 1	Operated
			Bit 2	Latched
FC147	16 Bits	LED Intensity	0	Level 1
			3	Level 2
			6	Level 3
			9	Level 4
			12	Level 5
			15	Level 6
FC148	16 Bits	Trigger Mode	0	Retrigger
			1	One Shot
FC150	32 Bits	IP Address	----	IP address, subnet mask or default gateway Each byte in this register represents one octet of an IP address. For example: 0x015EDA1F represents address 19421831
FC158	16 Bits	ATS Source Status	0	Not Accepted
			1	Accepted

TABLE 3.2.6.1.1 FORMAT CODE DEFINITIONS (Page 9 of 19 Pages)

<b><u>FORMAT CODE</u></b>	<b><u>TYPE</u></b>	<b><u>FORMAT CODE DEFINITION</u></b>	<b><u>SUB-CODE.</u></b>	<b><u>SUB-CODE DEFINITION &amp; EXAMPLES</u></b>
FC159	16 Bits	ATS Type	0	Std (Open) Trans
			1	Std (Open) Bypass
			2	Delayed Trans
			3	Delayed Bypass
			4	Closed Trans
			5	Closed Trans Bypass
			6	Delayed CB Type
			7	Closed CB Type
FC161	16 Bits	ATS Source	0	S1
			1	S2
FC163	16 Bits	Exerciser Period	0	OFF
			1	Daily
			2	Weekly
			3	14 Days
			4	28 Days
			5	365 Days
FC165	16 Bits	Reserved		
FC166	16 Bits	Reserved		
FC167	32 Bits	Contact/Virtual Input/Output Status	Bit 0	Input/Output 1
			Bit 1	Input/Output 2
			Bit 2	Input/Output 3
			Bit 3	Input/Output 4
			Bit 4	Input/Output 5
			Bit 5	Input/Output 6
			Bit 6	Input/Output 7
			Bit 7	Input/Output 8
			Bit 8	Input/Output 9
			Bit 9	Input/Output 10
			Bit 10	Input/Output 11
			Bit 11	Input/Output 12
			Bit 12	Input/Output 13
			Bit 13	Input/Output 14
			Bit 14	Input/Output 15
			Bit 15	Input/Output 16
			Bit 16	Input/Output 17
			Bit 17	Input/Output 18
			Bit 18	Input/Output 19
			Bit 19	Input/Output 20
			Bit 20	Input/Output 21
			Bit 21	Input/Output 22
			Bit 22	Input/Output 23
			Bit 23	Input/Output 24
			Bit 24	Input/Output 25
			Bit 25	Input/Output 26
			Bit 26	Input/Output 27
			Bit 27	Input/Output 28
			Bit 28	Input/Output 29
			Bit 29	Input/Output 30
			Bit 30	Input/Output 31
			Bit 31	Input/Output 32

TABLE 3.2.6.1.1 FORMAT CODE DEFINITIONS (Page 10 of 19 Pages)

<b><u>FORMAT CODE</u></b>	<b><u>TYPE</u></b>	<b><u>FORMAT CODE DEFINITION</u></b>	<b><u>SUB-CODE.</u></b>	<b><u>SUB-CODE DEFINITION &amp; EXAMPLES</u></b>
FC168	32 Bits	Contact/Virtual Input/Output Status	Bit 0	Input/Output 33
			Bit 1	Input/Output 34
			Bit 2	Input/Output 35
			Bit 3	Input/Output 36
			Bit 4	Input/Output 37
			Bit 5	Input/Output 38
			Bit 6	Input/Output 39
			Bit 7	Input/Output 40
			Bit 8	Input/Output 41
			Bit 9	Input/Output 42
			Bit 10	Input/Output 43
			Bit 11	Input/Output 44
			Bit 12	Input/Output 45
			Bit 13	Input/Output 46
			Bit 14	Input/Output 47
			Bit 15	Input/Output 48
			Bit 16	Input/Output 49
			Bit 17	Input/Output 50
			Bit 18	Input/Output 51
			Bit 19	Input/Output 52
			Bit 20	Input/Output 53
			Bit 21	Input/Output 54
			Bit 22	Input/Output 55
			Bit 23	Input/Output 56
			Bit 24	Input/Output 57
			Bit 25	Input/Output 58
			Bit 26	Input/Output 59
			Bit 27	Input/Output 60
			Bit 28	Input/Output 61
			Bit 29	Input/Output 62
			Bit 30	Input/Output 63
			Bit 31	Input/Output 64
FC169	16 Bits	Month	0	Not Set
			1	January
			2	February
			3	March
			4	April
			5	May
			6	June
			7	July
			8	August
			9	September
			10	October
			11	November
			12	December
FC170	16 Bits	Count of Week	0	Not Set
			1	1 <sup>st</sup>
			2	2 <sup>nd</sup>
			3	3 <sup>rd</sup>
			4	4 <sup>th</sup>
			5	Last
FC171	16 Bits	Weekdays	0	Not Set
			1	SUN
			2	MON
			3	TUE
			4	WED
			5	THU
			6	FRI
			7	SAT



TABLE 3.2.6.1.1 FORMAT CODE DEFINITIONS (Page 11 of 19 Pages)

<b><u>FORMAT CODE</u></b>	<b><u>TYPE</u></b>	<b><u>FORMAT CODE DEFINITION</u></b>	<b><u>SUB-CODE.</u></b>	<b><u>SUB-CODE DEFINITION &amp; EXAMPLES</u></b>
FC176	16 Bits	Auxiliary VT Connection	0	Vab VT
			1	Vbc VT
			2	Vca VT
			3	Van VT
			4	Van VT
			5	Van VT
			6	Van Direct
			7	Vbn Direct
			8	Vcn Direct
FC179	32 Bits	Alarm Status 1	Bit 0	Any Alarm
			Bit 10	Current Imbalance Alarm
			Bit 19	Process ILock A Alarm
			Bit 20	Process ILock B Alarm
			Bit 21	Process ILock C Alarm
			Bit 22	Process ILock D Alarm
			Bit 23	Process ILock E Alarm
			Bit 24	Process ILock F Alarm
			Bit 25	Process ILock G Alarm
			Bit 26	Process ILock H Alarm
			Bit 27	Process ILock I Alarm
			Bit 28	Process ILock J Alarm
FC180	32 Bits	Alarm Status 2	Bit 17	Self-Test Alarm
			Bit 18	Comm Fail Alarm
FC181	32 Bits	Alarm Status 3	Bit 11	CB86 Input Present
			Bit 12	ATS Isolated
			Bit 13	Bypass ATS on S2
			Bit 14	Bypass ATS on S1
			Bit 15	S1 OK
			Bit 16	S2 OK
			Bit 17	Voltage Diff > Setting
			Bit 18	Low Power Factor
			Bit 19	Overpower kW
			Bit 20	Phase A Overcurrent
			Bit 21	Phase B Overcurrent
			Bit 22	Phase C Overcurrent
			Bit 23	Neutral Overcurrent
			Bit 24	S1 to S2 Manual Xfer
			Bit 25	S2 to S1 Manual Xfer
			Bit 26	S1 Volt THD
			Bit 27	S2 Volt THD
			Bit 30	Current THD

TABLE 3.2.6.1.1 FORMAT CODE DEFINITIONS (Page 12 of 19 Pages)

<b><u>FORMAT CODE</u></b>	<b><u>TYPE</u></b>	<b><u>FORMAT CODE DEFINITION</u></b>	<b><u>SUB-CODE.</u></b>	<b><u>SUB-CODE DEFINITION &amp; EXAMPLES</u></b>
FC182	32 Bits	Alarm Status 4	Bit 0	CTAP Audible Alarm
			Bit 1	S2 Shunt Fault
			Bit 2	S1 UnderVoltage
			Bit 3	S1 OverVoltage
			Bit 4	S1 Underfrequency
			Bit 5	S1 Overfrequency
			Bit 6	S2 UnderVoltage
			Bit 7	S2 OverVoltage
			Bit 8	S2 Underfrequency
			Bit 9	S2 Overfrequency
			Bit 10	S1 Volt Imbalance Alarm
			Bit 11	S2 Volt Imbalance Alarm
			Bit 12	Inhibited via Disconnect Switch
			Bit 13	Switch Exercising
			Bit 14	Neutral Position
			Bit 15	Xfer to Alternate Source
			Bit 16	S1 to S2 Auto Xfer Alert
			Bit 17	S2 to S1 Auto Xfer Alert
			Bit 18	S1 to S2 Inhibit
			Bit 19	S2 to S1 Inhibit
			Bit 20	Engine Start
			Bit 21	Auto Load Shed Active
			Bit 22	Not in Auto
			Bit 23	S1 Failure
			Bit 24	Alternate Source Fail to Start
			Bit 25	S1 Disconnected
			Bit 26	S2 Disconnected
			Bit 27	S1 Connected
			Bit 28	S2 Connected
			Bit 29	Freqs Differ >Setting
			Bit 30	Test Initiated
FC183	32 Bits	Fault Status 1	Bit 0	Any Fault
			Bit 17	Comm Fail Fault
			Bit 18	Relay Not Configured
			Bit 19	Process ILock A Fault
			Bit 20	Process ILock B Fault
			Bit 21	Process ILock C Fault
			Bit 22	Process ILock D Fault
			Bit 23	Process ILock E Fault
			Bit 24	Process ILock F Fault
			Bit 25	Process ILock G Fault
			Bit 26	Process ILock H Fault
			Bit 27	Process ILock I Fault
			Bit 28	Process ILock J Fault
FC184	32 Bits	Fault Status 2 (Reserved)		
FC185	32 Bits	Fault Status 3 (Reserved)		

TABLE 3.2.6.1.1 FORMAT CODE DEFINITIONS (Page 13 of 19 Pages)

<b><u>FORMAT CODE</u></b>	<b><u>TYPE</u></b>	<b><u>FORMAT CODE DEFINITION</u></b>	<b><u>SUB-CODE.</u></b>	<b><u>SUB-CODE DEFINITION &amp; EXAMPLES</u></b>
FC186	32 Bits	Fault Status 4	Bit 8	ATS Lockout
			Bit 9	S1 Failure to Disconnect
			Bit 10	S2 Failure to Disconnect
			Bit 11	S1 Failure to Connect
			Bit 12	S2 Failure to Connect
			Bit 13	S1 & S2 Fail to Disconnect
			Bit 14	Phase Rotation Error
			Bit 15	Sources Out of Phase
			Bit 16	S1 Aux Cont Not Closed
			Bit 17	S1 Aux Cont Not Opened
			Bit 18	S2 Aux Cont Not Closed
			Bit 19	S2 Aux Cont Not Opened
			Bit 20	S1 Del Lmt Sw Not Closed
			Bit 21	S1 Del Lmt Sw Not Opened
			Bit 22	S2 Del Lmt Sw Not Closed
			Bit 23	Any Transfer Fault
FC187	32 Bits	Message Status 1	Bit 0	Any Messages
			Bit 1	Transfer Timer
			Bit 5	No Control Source
			Bit 6	Clock Not Set
FC188	32 Bits	Message Status 2	Bit 1	IO Communication Failure
			Bit 2	Metering Failure
			Bit 3	Order Code Error
			Bit 4	Clock Error
			Bit 5	Calibration Error
			Bit 6	EEPROM Error
			Bit 7	IO Input Read Error
			Bit 8	IO 3.3V Error
			Bit 9	IO 5V Error
			Bit 10	IO -5V Error
			Bit 11	IO Input OverVoltage
			Bit 12	IO Frequency Error
			Bit 13	DPRAM Error
			Bit 14	System Health Error
FC189	32 Bits	Message Status 3	Bit 26	Post Load Disconnect Delay LC1
			Bit 27	Post Load Disconnect Delay LC2
			Bit 28	Post Load Disconnect Delay LC3
			Bit 29	Post Load Disconnect Delay LC4
			Bit 30	Post Load Disconnect Delay LC5
			Bit 31	Post Load Disconnect Delay LC6

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<b><u>FORMAT CODE</u></b>	<b><u>TYPE</u></b>	<b><u>FORMAT CODE DEFINITION</u></b>	<b><u>SUB-CODE.</u></b>	<b><u>SUB-CODE DEFINITION &amp; EXAMPLES</u></b>
FC190	32 Bits	Message Status 4	Bit 0	System Test
			Bit 1	Fast Test
			Bit 2	LC1 Output Inactive
			Bit 3	LC2 Output Inactive
			Bit 4	LC3 Output Inactive
			Bit 5	LC4 Output Inactive
			Bit 6	LC5 Output Inactive
			Bit 7	LC6 Output Inactive
			Bit 8	Manual Transfer to S1
			Bit 9	Manual Transfer to S2
			Bit 10	Open Transition Xfer?
			Bit 11	Lockout Reset?
			Bit 12	ATS Lockout - Check ATS Drive
			Bit 13	Generator Start Delay
			Bit 14	S1 to S2 Transfer Delay
			Bit 15	S2 to S1 Transfer Delay
			Bit 16	Engine CoolDown Delay
			Bit 17	ATS Open Delay
			Bit 18	ATS Open Delay
			Bit 19	Gen Run Timer Countdown
			Bit 20	Load Disconnect Delay (LC1)
			Bit 21	Load Disconnect Delay (LC2)
			Bit 22	Load Disconnect Delay (LC3)
			Bit 23	Load Disconnect Delay (LC4)
			Bit 24	Load Disconnect Delay (LC5)
			Bit 25	Load Disconnect Delay (LC6)
			Bit 26	CT Differential Too Great
			Bit 27	Fail Restore Entry Invalid
			Bit 28	Inhibit Transfer to S2 Enabled
			Bit 29	Bypass All S2 Timers Enabled
			Bit 30	Utility Sag Timer
FC191	32 Bits	Control Element Status 1	Bit 12	Level 1 Access
			Bit 13	Level 2 Access
			Bit 14	Level 3 Access
FC192	32 Bits	Control Element Status 2		
FC193	32 Bits	Control Status 3 (Reserved)		

TABLE 3.2.6.1.1 FORMAT CODE DEFINITIONS (Page 15 of 19 Pages)

<b><u>FORMAT CODE</u></b>	<b><u>TYPE</u></b>	<b><u>FORMAT CODE DEFINITION</u></b>	<b><u>SUB-CODE.</u></b>	<b><u>SUB-CODE DEFINITION &amp; EXAMPLES</u></b>
FC194	32 Bits	Control Status 4	Bit 0	S2 Sgl Operator
			Bit 1	S2 Dual Operator
			Bit 2	S1 Sgl Operator
			Bit 3	S1 Dual Operator
			Bit 4	Engine Start Signal (Open=ON)
			Bit 7	S1 Connected
			Bit 8	S2 Connected
			Bit 9	Load Control 1
			Bit 10	Load Control 2
			Bit 11	Load Control 3
			Bit 12	Load Control 4
			Bit 13	Load Control 5
			Bit 14	Load Control 6
			Bit 15	S2 is Set as Pref
			Bit 16	S1 CB Fail to Close
			Bit 17	S2 CB Fail to Close
			Bit 18	Remove S1 from RPTCS
			Bit 19	Remove S2 from RPTCS
			Bit 20	S1 CB Closed
			Bit 21	S1 CB Open
			Bit 22	S1 CB Relay Lockout
			Bit 23	S2 CB Closed
			Bit 24	S2 CB Open
			Bit 25	S2 CB Relay Lockout
			Bit 26	Remote Timer Bypassed
			Bit 27	S2 Remote Load Shed
			Bit 28	RPTCS Engine Start
			Bit 29	S1 Breaker Racked Out
			Bit 30	S2 Breaker Racked Out
FC197	16 Bits	Number of Poles	0	Two Poles
			1	Three Poles
			2	Four Poles
FC198	16 Bits	ATS Transfer Sequence	0	None
			1	S1 to S2
			2	S2 to S1
FC199	16 Bits	ATS Transfer	0	None
			1	S1
			2	S1 Open
			3	S2
			4	S2 Open
			5	None

TABLE 3.2.6.1.1 FORMAT CODE DEFINITIONS (Page 16 of 19 Pages)

<b><u>FORMAT CODE</u></b>	<b><u>TYPE</u></b>	<b><u>FORMAT CODE DEFINITION</u></b>	<b><u>SUB-CODE.</u></b>	<b><u>SUB-CODE DEFINITION &amp; EXAMPLES</u></b>
FC200	16 Bits	ATS Present State	0	Load Connected to S1
			1	Waiting to Start Gen
			2	Starting Generator
			3	Waiting for S2 OK
			4	Waiting to Conn S2
			5	Transferring to S2
			6	Load Connected to S2
			7	Waiting to Start Gen
			8	Starting Generator
			9	Load Connected to S2
			10	Waiting to Conn S1
			11	Transferring to S1
			12	Waiting to Stop Gen
			13	Stopping Gen
			14	Test in Progress
			15	S1 Failed. Checking S2
			16	Waiting for In Phase
			17	Sync Fail-Bypass Wait
			18	Exerciser Count Down
			19	Transferring to Center
			20	Transferring to Center
			21	Delayed Close on S1
			22	Delayed Close on S2
			23	Waiting to Conn S2
			24	Waiting to Conn S1
			25	Waiting to Close to S2
			26	CT Open S1 after Xfer
			27	Waiting to Close to S1
			28	CT Open S2 after Xfer
			29	Waiting for Reset Key
			30	Manual Xfer Mode
			31	CB86 Input Present
FC201	16 Bits	ATS Operating Mode	0	None
			1	Normal
			2	Test On Load
			3	Test No Load
			4	Exerciser On Load
			5	Exerciser No Load
FC202	16 Bits	Switch Position	0	On Generator
			1	On Normal Src
FC212	16 Bits	LCD Test Paint Color	0	None
			1	Red
			2	Green
			3	Blue
FC300	16 Bits	ATS Transfer Timer	0	None
			1	Engine Start1 Tmr Countdown
			2	Engine Start2 Tmr Countdown
			3	Delay to Non Pref Src Tmr Countdown
			4	Delay to Pref Src Tmr Countdown
			5	N to Non Pref Src Tmr Countdown
			6	N to Pref Src Tmr Countdown
FC301	16 Bits	ATS Elevator Timer	0	None
			1	Elevators 123
			2	Elevators 123

TABLE 3.2.6.1.1 FORMAT CODE DEFINITIONS (Page 17 of 19 Pages)

<b><u>FORMAT CODE</u></b>	<b><u>TYPE</u></b>	<b><u>FORMAT CODE DEFINITION</u></b>	<b><u>SUB-CODE.</u></b>	<b><u>SUB-CODE DEFINITION &amp; EXAMPLES</u></b>
FC302	16 Bits	Exerciser Status	0	None
			1	In Progress
			2	Pending
			3	Bypass
			4	Cancel
			5	Over
FC303	16 Bits	Load Type	0	Gen Start And Xfer
			1	Gen Start Only
FC306	16 Bits	Phase Sync Status	0	No Sync Status
			1	Synchronized
			2	Phasing In
			3	Phasing Out
FC308	16 Bits	Frequency Status	0	None
			1	Within Limit
			2	Under Frequency Fail
			3	Under Frequency Restore
			4	Over Frequency Fail
			5	Over Frequency Restore
FC309	16 Bits	Voltage Status	0	None
			1	Within Limit
			2	Under Voltage Fail
			3	Under Voltage Restore
			4	Over Voltage Fail
			5	Over Voltage Restore
FC311	16 Bits	Phase Rotation Seq	0	1 Ph
			1	ABC
			2	CBA
			3	----
FC312	16 Bits	Src No. Of Phases	1	Single Phase
			2	Three Phase
FC313	16 Bits	Src Type	1	Utility
			2	Generator
FC315	16 Bits	ATS Status in Transfer Mode	0	None
			1	S1 Failed
			2	S2 Failed
			5	Test Load Xfer
			6	Test No Load Xfer
			7	Exerciser Running
			8	Exerciser Bypassed
			9	Exerciser Load Test
			10	Exerciser No Load
			11	ATS Lockout State
			12	Shunt Fault Failure
FC316	32 Bi9ts	Date MM/DD	1 <sup>st</sup> Byte	Month 1 to 12
			2 <sup>nd</sup> Byte	Day 1 to 31
FC 317	16 Bits	Transfer Type	0	Auto
			1	Manual S1 to S2, S2 to S1
			2	Manual S2 to S1 Only
FC 318	16 Bits	Transfer Reason	0	Outage
			1	Test with Load
FC 320	16 Bits	Load Test Status	0	Load Test in Progress
			1	No Load Test in Progress
			2	Load Exerciser in Progress
			3	No Load Exerciser in Progress
			4	Cannot Accept Test Request
			5	To Exit Test Mode: Press Cancel
			6	To Abort Exerciser: Press Cancel
			7	Select Test Type (Load/No Load)

TABLE 3.2.6.1.1 FORMAT CODE DEFINITIONS (Page 18 of 19 Pages)

<b><u>FORMAT CODE</u></b>	<b><u>TYPE</u></b>	<b><u>FORMAT CODE DEFINITION</u></b>	<b><u>SUB-CODE.</u></b>	<b><u>SUB-CODE DEFINITION &amp; EXAMPLES</u></b>
FC321	32 Bits	Net Control	Bit 0	Reset Time S2 Available Counter
			Bit 1	Alarm Silence
			Bit 2	Manual Xfer to S2 Control
			Bit 3	Manual Xfer to S1 Control
			Bit 4	No Load Test Control
			Bit 6	Regular Load Test Control
			Bit 7	Manual Xfer S2 to S1 Control
			Bit 8	Manual Xfer S1 to S2 Control
			Bit 9	Load Shed Control
			Bit 10	Inhibit Xfer to S2 Control
			Bit 11	Inhibit Xfer to S1 Control
			Bit 12	TMS_Ctrl
			Bit 13	Command to Bypass Phase Monitoring
			Bit 14	Confirm Bypass Phase Monitoring
			Bit 15	Cancel Bypass Phase Monitoring
			Bit 16	Pending Exerciser
			Bit 17	Cancel Exerciser Bypass
			Bit 18	Net Ctrl Auto Transfer Inhibit
			Bit 19	Net Ctrl Auto Transfer Relay
			Bit 20	Net Ctrl Bypass Active ATS Timer
			Bit 21	Net Ctrl Exerciser Cancel
			Bit 22	Net Ctrl Generator Start
			Bit 23	Net Ctrl Generator Stop
			Bit 24	Net Ctrl Load Shed for S2
			Bit 25	Net Ctrl Prime Source Selection
			Bit 26	Net Ctrl Test Mode Cancel
			Bit 27	Net Ctrl Test On Load
			Bit 28	Net Ctrl Transfer Commit
FC325	16 Bits	Switch Option	0	Automatic Only
			1	Automatic/Manual
			2	Manual Only
FC326	16 Bits	Auto Load Shed Mode	1	Remote Load Shed
FC329	16 Bits	Installed/Not Installed Selection	0	Not Installed
			1	Installed
FC330	16 Bits	Test Status	0	Not Active
			1	Active
FC331	16 Bits	RPTCS Amp Options	0	100 A
			1	150 A
			2	225 A
			3	260 A
			4	400 A
			5	600 A
			6	800 A
			7	1000 A
			8	1200 A
			9	1600 A
			10	2000 A
			11	2500 A
			12	3000 A
			13	4000 A
FC332	16 Bits	TMS AV	0	eFMT_Delayed
			1	eFMT_Closed
			2	eFMT_NotApp



TABLE 3.2.6.1.1 FORMAT CODE DEFINITIONS (Page 19 of 19 Pages)

<b><u>FORMAT CODE</u></b>	<b><u>TYPE</u></b>	<b><u>FORMAT CODE DEFINITION</u></b>	<b><u>SUB-CODE.</u></b>	<b><u>SUB-CODE DEFINITION &amp; EXAMPLES</u></b>
FC333	16 Bits	RPTCS ATS Rated Voltage	0	120 V
			1	180 V
			2	208 V
			3	220 V
			4	230 V
			5	240 V
			6	277 V
			7	380 V
			8	400 V
			9	416 V
			10	440 V
			11	460 V
			12	480 V
			13	575 V
			14	600 V
FC399	16 Bits	RPTCS Load Control	0	Not Set
			1	Elevator 1 or 2 or 3
FC407	16 Bits	Controller Model Number	0	RPTCS-01
			1	RPTCS-02
			2	RPTCS-03
			3	RPTCS-04
			4	RPTCS-05
			5	Not Set

### 3.3 ETHERNET INTERFACE

- 3.3.1 The 10/100Base-T Ethernet interface is configured as a Modbus RTU slave. The Ethernet port has the following characteristics.
  - 3.3.1.1 Configuration: setup using IP address, subnet mask, and gateway address
  - 3.3.1.2 Supported Modbus function codes: 1, 3, 4, 5, 6, and 16.
  - 3.3.1.3 Supports time/date synchronization via the Network Time Protocol (NTP).
  - 3.3.1.4 Ethernet port 502.
  - 3.3.1.5 Supports a maximum of 5 virtual connections.
- 3.3.2 The Ethernet interface has the same memory map layout as the serial Modbus RTU interface (see Para. 3.2.5).
- 3.3.3 Network Time Protocol is enabled if the NTP address is non-zero and the source is detected.
- 3.3.4 Once connected to the source, the clock is updated every 30 seconds.
- 3.3.5 **NOTE:** If the IP address of the RPTCS is changed for any reason, the relay must be powered down then restarted in order for the new IP address to take effect.