ASG-NW2500-ACOP

ACOP Network Communication Module

User's Guide

Version 1.0.0

December, 2010

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Safety Precautions

Be sure to read all instructions and precautions contained in this manual, failure to do so may result in personal injury and/or damage to tooling and components.

Do not operate or plug in the controller/system with wet hands or in wet environments. Failure to observe this may result in injury due to electric shock.

Ensure the controller is properly plugged in to a grounded electrical receptacle. Do not remove the ground pin or use any adapter plugs.

Always shut down the controller when changing cables or tools. Failure to do so could damage the tool or controller.

Keep work area clear of clutter and distractions that may cause the operator to lose control of the tool or the components.

Tool cable must be properly routed and festooned to avoid tangling and trip hazards.

Always use safety glasses when using electrical assembly tools.

Do not use any part of the system (tool, cable, or controller) for anything other than its specified application. Use of the system or its components for unintended applications could result in injury to the operator, failure of the system, and could void the warranty.

Never modify or disassemble any component of the system. Modification or disassembly of the system could result in injury and void the warranty.

Installation

Ensure power is off to the CT2500 controller and unplug the power cable.

Remove NW2500 Module from its packaging, and locate the Network Module Input Plug on the bottom of the module.

Network Module
Input port
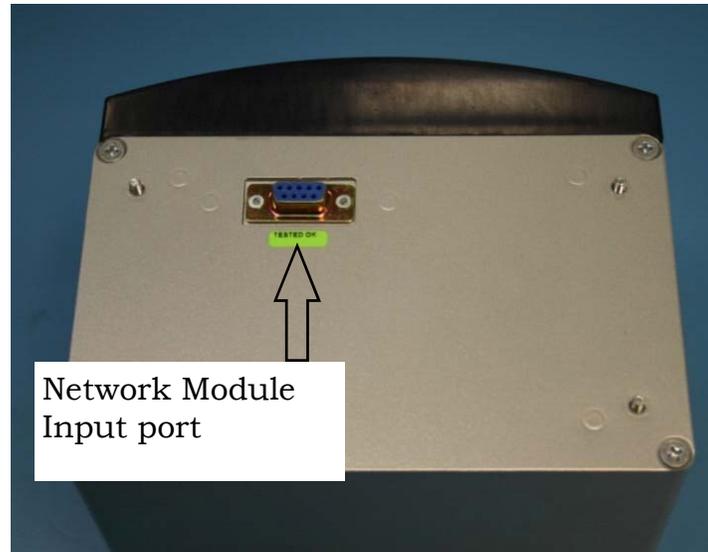
Align the Network Module Input Port to the mating connector on the top of the CT2500 controller.
Tighten (4) captive screws to secure the Network Module to the Controller.

Tighten (4)
Screws

Installation Continued.

Reconnect power to the CT2500 Controller, and then turn on the power to the Controller.

Verify the Network Module powers up properly by looking to see if the Network Module Display is lit and has its IP address displayed.

Quick Start Guide:

Step 1: Power up the NW2500-ACOP module.

Step 2: Be sure that the unit is physically connected to the network through the Ethernet connection (RJ45 Connector).

Step 3:

Use the network user interface and enter the program mode by pressing the ENT key. The unit will prompt the user for a password at this point, the default is "0 1 0 4". Using the keypad, enter the password.

Step 4 Set IP Address:

Scroll through the program menu until the unit displays IP Address. Press the ENT key to view the unit's IP address. Using the arrow keys alter this address to the desired value (please consult your IT group for this address). Press the ENT key to store the value.

Step 5 Subnet Mask:

The Subnet Mask helps the unit determine which IP addresses are local and which lie beyond a Gateway. Press the ENT key to view the unit's Subnet Mask. Using the arrow keys alter this setting to the desired value (please consult your IT group for this value). Press the ENT key to store the value.

Step 6 Gateway:

The Gateway setting holds the address of the device that will allow this unit to send and receive messages with devices that are not on the local network. Press the ENT key to view the unit's Gateway address. Using the arrow keys alter this setting to the desired value (please consult your IT group for this value). Press the ENT key to store the value.

Step 7 Port Numbers:

Typically, this protocol uses port number 4545 for communication. However, that value can be changed. Press the ENT key to view the unit's Port Number. Using the arrow keys alter this setting to the desired value (please consult your IT group for this value). Press the ENT key to store the value.

Step 8 Keep Alive:

This device acts as a server. A client device will make a connection to this device and set several subscriptions to various services. If there is not activity, the client is responsible for sending Keep Alive messages to keep the connection open. Press the ENT key to view the unit's Keep Alive Setting. Using the arrow keys alter this setting to the desired value. Press the ENT key to store the value.

Step 9 Checking for Connectivity:

Press the ESC key to return to the main screen. Using the UP/DOWN keys the user can choose to view either the unit's IP address or the client's. The Client IP Address screen can be useful in determining if an active connection to the target computer has been made or not. If a connection has not yet been made or has been dropped, this screen will read DISCONNECTED". If a connection is active, this screen will display the IP address of the client's computer.

Overview:

The Network Module is equipped with a network card that provides connectivity to a Plant Floor Control System using the Atlas Open Protocol. This interface includes a network card, a human-machine interface (LCD display &keypad), two additional serial ports, and an RJ45 network connector.

Human-Machine Interface:
The human machine interface (HMI) consists of an 2-line by 16 character backlit LCD display and a six button keypad. During power-up, the display on the HMI will display the firmware version contained inside the microprocessor's memory. During operation, the HMI will show the unit's IP address and the client's IP address if the unit is successfully connected to the network. The HMI is also used during the programming phase allowing the user to enter program menus. These program menus allow access to settings that govern how the ACOP interface functions.

Network Connector (RJ45):
The Ethernet port is used to transmit and receive TCP/IP messages that are formatted to comply with the Atlas Open Protocol.

Bar Code Reader:

DSUB– PINOUT
2-RX
3-TX
5-GND

A male DSUB9 connector is provided so that this unit can receive commands from a serial bar-code reader. This unit was developed using a Symbol LS2208 bar code reader and uses CODE39 bar codes. Bar code formats are discussed later in the manual.

Operating Mode:

When the ACOP network interface powers up, the display briefly shows the firmware version information and then the unit enters it's operating mode.

In the main operating mode, the display will show the unit's IP address or the client's IP address. Using the UP or DOWN keys the user can select which IP address is visible.

The client IP address screen can be used to determine if the unit has successfully connected to the target PC. If a connection has not been established, this screen will read "Disconnected". If the connection is established the client IP address will be displayed

Program Mode:

There are several items that are user configurable through the programming menu. In order to reach this menu from the main display, press the enter (ENT) key.

The display will prompt the user to enter a password before reaching the programming menu. The default password is "0 1 0 4".

While entering the password, the left and right arrow keys will move the cursor back and forth. The up and down arrows will raise and lower the value of the digit that the cursor is high-lighting.

The escape key (ESC) will send the program back to the main screen without attempting to read the password. If the enter key (ENT) is pressed, the unit will compare the entered password to the password that is stored in the unit's non-volatile memory. If these values match, the unit will continue onto the programming menu.

Programming the Unit's IP Address:

It's important that each device on the network has it's own unique IP address. In order to edit this interface's IP address, select Programming IP Address from the main menu and press enter.

The current IP address will be displayed at this point. In order to change the address use the LEFT and RIGHT arrow keys to select any given digit in the address and then use the UP and DOWN keys to alter that digit's value.

Once the desired IP address is displayed, the enter key can be pressed to save that value. All programmable values are stored in non-volatile memory. This allows the unit to "remember" these values even when the unit is turned off and unplugged. The escape key can be pressed any time during the editing process allowing the user to return to the main menu without saving a new value

Programming the Unit's Subnet Mask:

The Subnet Mask is used to identify which part of the IP address is the network ID and which part is the host ID. This is accomplished by a logical bitwise ANDing of the IP address and the netmask.

In order to edit the netmask, select Subnet Mask from the main menu and press enter. The current mask value will be displayed at this point. In order to change the mask's value use the LEFT and RIGHT arrow keys to select any given digit in the address and then use the UP and DOWN keys to alter that digit's value. Pressing the enter key will allow the user to save the new subnet mask that is displayed on the LCD. The escape key can be pressed any time during the editing process allowing the user to return to the main menu without saving a new value.

Programming the Gateway:

Gateways perform routing functions. This gateway value identifies the router that connects a LAN to other networks. Some gateways also perform protocol conversions.

In order to edit this gateway's IP address, select Gateway from the main menu and press enter.

The current gateway address will be displayed at this point. In order to change the address use the LEFT and RIGHT arrow keys to select any given digit in the address and then use the UP and DOWN keys to alter that digit's value. Pressing the enter key will allow the user to save the gateway's IP address that is displayed on the LCD. The escape key can be pressed any time during the editing process allowing the user to return to the main menu without saving a new value.

Programming the Port Number:

The Port Number sets the service port value that is used to connect to the ACOP system.

This value is programmable to any number between 0 and 32000. Typically, the port value of 4545 is used with Atlas Open Protocol.

In order to edit the port, select Port Number from the main menu and press enter. The current port number will be displayed at this point. In order to change the address use the LEFT and RIGHT arrow keys to select any given digit in the address and then use the UP and DOWN keys to alter that digit's value.

Pressing the enter key will allow the user to save the port number that is displayed on the LCD. The escape key can be pressed any time during the editing process allowing the user to return to the main menu without saving a new value.

Programming the Message Timeout:

When this unit sends a message to the client, the client is expected to acknowledge that message.

The Message Timeout setting sets the amount of time that this unit will wait for an acknowledgement before re-sending the message or closing down the socket. The Message Timeout can be set to a value between 5 and 30 seconds.

In order to program the Message Timeout, select Message Timeout from the main menu and press enter. The current timeout value (in seconds) will be displayed at this point. In order to change the value the arrow keys may be pressed. The UP key will add one second, DOWN will subtract a second, RIGHT will add 10 seconds, and LEFT will subtract 10 seconds from the value. Pressing the enter key will allow the user to save the value that is displayed on the LCD. The escape key can be pressed any time during the editing process allowing the user to return to the main menu without saving.

Programming the Resend Attempts:

When a message is sent to the ACOP system and an acknowledgment is not received, this unit will wait for an amount of time defined by the ACK Timeout setting before resending the message. The number of times the unit will attempt sending a message is defined by the Re-try Limit.

If the Retry Limit is reached without a receiving an appropriate response, the socket is closed. The retry limit is programmable between 1 and 10 attempts. In order to program the retry limit, select Resend Attempts from the main menu and press enter. The current limit value (number of attempts) will be displayed at this point. In order to change the value the arrow keys may be pressed. The UP key will add one attempt, DOWN will subtract an one attempt, RIGHT will add 10 attempts, and LEFT will subtract 10 attempts from the value. Pressing the enter key will allow the user to save the value that is displayed on the LCD. The escape key can be pressed any time during the editing process allowing the user to return to the main menu without saving.

Programming the Keep Alive:

This unit expects to see messages from the client on a regular interval. The Keep Alive value defines the amount of time that this unit will wait to see a message before closing the socket.

If a data message does not need to be sent within this time interval, the client should send a keep-alive message.

The keep alive value can be programmed to a value between 30 and 240 seconds. In order to program the keep alive timeout, select Keep Alive from the program menu and press enter. The current timeout value (in seconds) will be displayed at this point. In order to change the value the arrow keys may be pressed. The UP key will add one second, DOWN will subtract a second, RIGHT will add 10 seconds, and LEFT will subtract 10 seconds from the value. Pressing the enter key will allow the user to save the value that is displayed on the LCD. The escape key can be pressed any time during the editing process allowing the user to return to the main menu without saving.

Programming the No Message Timeout:

In a system where a keep alive messages are not desired, the No Message Timeout can be implemented to close the socket if communications are lost.

The operation of the No Message Timeout is very similar to the Keep Alive timer. If a valid message is not received before this timer times out, the socket will close and wait for a new connection to be made.

If this timer is set to 0, it will be unused.

In order to program the no message time, select No Msg Timeout from the program menu and press enter.

The current timeout value (in seconds) will be displayed at this point. In order to change the value the arrow keys may be pressed. The UP key will add one second, DOWN will subtract a second, RIGHT will add 10 seconds, and LEFT will subtract 10 seconds from the value.

Pressing the enter key will allow the user to save the value that is displayed on the LCD.

The escape key can be pressed any time during the editing process allowing the user to return to the main menu without saving.

Programming Xmit REV/SPACE:

Messages in the Atlas Open Protocol are comprised of a Header, Data Field, and a Null at the end of the message.

Each message's header contains length of message, MID, revision, and a spare fields.

The revision field describes which revision of message is being sent. Some messages, like tightening results, can have multiple revisions. If the revision is 001, spaces can be sent in place of the revision information. To have this unit send spaces instead of 001 for revision one messages scroll through the programming message until the display reads Xmit REV/SPACE. Press the ENT key and the current setting will be displayed. The arrow keys can be used to toggle this value between 0 for including the revision or 1 for spaces. Pressing the enter key will allow the user to save the value that is displayed on the LCD. The escape key can be pressed any time during the editing process allowing the user to return to the main menu without saving.

Programming, Control Cell ID, Channel, & Name :
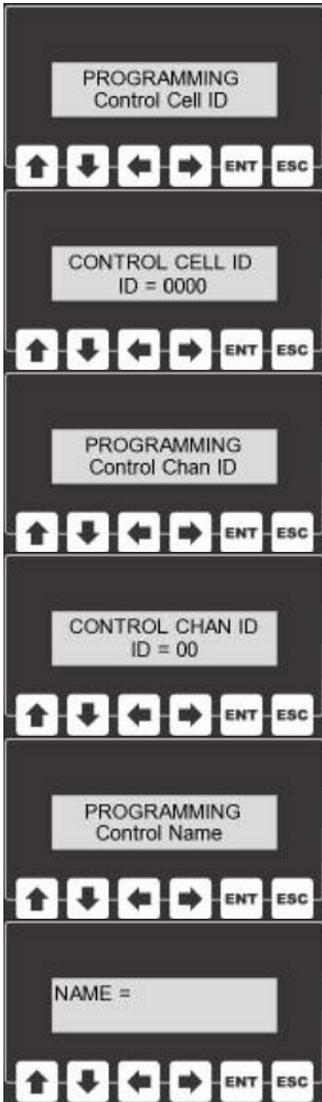
Torque records contain a Control Cell ID, Control Channel and Control Name. All of these items are alpha-numeric fields that will be placed in a record each time a torque event occurs.

To change one of these alphanumeric values, select the appropriate control field from the programming menu and press the ENT key.

After pressing the ENT key, the alpha numeric field will appear on the display. The Up and Down arrows will allow the user to change each individual character. The Left and Right arrows will allow the user to select anew character to edit.

Once the alpha-numeric value is edited it can be stored into memory by pressing the ENT key.

The ESC key can be pressed any time during the editing process allowing the user to return to the main menu without saving a new value.

Programming Bar Code Function:

A bar code reader can be used to program items on the fly as the assembly process changes. In order to use a bar code reader with this system, the bar coding function must be turned on through the programming menu.

After Bar Code Reader has been selected from the program menu by pressing the ENT key, a baud rate can be selected by using the arrow keys. If a bar code reader is not being used, this function can also be turned off.

The comm port is set up to receive 8 data bits with no parity and 1 stop bit (8N1). The baud rate can be set to 9600, 19200, 38400, 57600 and 115200 baud. While the desired baud rate is shown on the display, the ENT key can be pressed to save this value. The ESC key can be pressed any time during the editing process allowing the user to return to the main menu without saving a new value. The following values can be modified via the bar-code reader: Cell ID, Channel ID, Controller Name, VIN AND Job Number.

Changing the Password:

In order to gain access to the programming menu, the user must enter a password. The password is a four digit (numeric) code.

All units ship with a default code of "0 1 0 4". This default code may be changed to a value that is more easily remembered by the user.

In order to edit the password, select Edit Password from the programming menu and press enter.

To change the password use the LEFT and RIGHT arrow keys to select any given digit in the address and then use the UP and DOWN keys to alter that digit's value.

Pressing the enter key will allow the user to save the new password.

The escape key can be pressed any time during the editing process allowing the user to return to the main menu without saving a new value.

Ethernet Functionality:

The ACOP interface acts as a server. This server waits for a client to make a connection with it and can only accept one connection at a time.

The TCP/IP messages that are sent and received by this unit adhere to the Power-Focus Open Protocol version 3.0.

Supported Commands:

This control will send the following commands/responses.

MID	DESCRIPTION
0002	COMMUNICATION START ACK
0004	COMMAND ERROR
0005	COMMAND ACCEPTED
0011	COMMAND ACCEPTED
0013	PARAMETER SET DATA UPLOAD REPLY
0015	PARAMETER SET SELECTED
0041	TOOL DATA UPLOAD REPLY
0052	VEHICLE ID NUMBER UPLOAD
0061	LAST TIGHTENING RESULT DATA UPLOAD
0065	OLD TIGHTENING RESULT REPLY
0081	TIME UPLOAD REPLY

Ethernet Functionality (Continued)

The system will accept the following:

MID	DESCRIPTION
0001	COMMUNICATION START
0003	COMMUNICATION STOP
0010	PARAMETER SET NUMBERS UPLOAD REQUEST
0012	PARAMETER SET DATA UPLOAD REQUEST
0014	PARAMETER SET SELECTED SUBSCRIBE
0016	PARAMETER SET SELECTED ACK
0017	PARAMETER SET SELECTED UNSUBSCRIBE
0018	SELECT PARAMETER SET
0019	SET PARAMETER SET BATCH SIZE
0020	RESET PARAMETER SET BATCH SIZE
0040	TOOL DATA UPLOAD REQUEST
0042	DISABLE TOOL
0043	ENABLE TOOL
0044	DISCONNECT TOOL
0050	VEHICLE ID NUMBER DOWNLOAD REQUEST
0051	VEHICLE ID NUMBER UPLOAD SUBSCRIBE
0053	VEHICLE ID NUMBER UPLOAD ACK
0054	VEHICLE ID NUMBER UPLOAD UNSUBSCRIBE
0060	LAST TIGHTENING RESULT DATA SUBSCRIBE
0062	LAST TIGHTENING RESULT DATA ACK
0063	LAST TIGHTENING RESULT DATA UNSUBSCRIBE
0064	OLD TIGHTENING RESULT UPLOAD REQUEST
0080	READ TIME UPLOAD REQUEST
0082	SET TIME IN THE TORQUE CONTROLLER
9999	KEEP ALIVE

Creating Bar Codes:

In order for the bar-code reader to decipher a given bar code as a command, the bar code must be formatted in a specific way. Using code 39 bar codes, the bar code must begin and end with an asterisk "*".
The bar code will also contain command and data sections. Each section of the bar code will be separated by percent "%" symbols.
For example, the command for the Cell ID is 01. The Cell ID is 4 data bytes long. So, if the Cell ID was to be programmed to be 1234, then the bar code would look like this:

%01%1234%

Bar Code (VIN):

VIN bar codes can be generated in one of two ways. They can be expressed in the command/data format like above, or without a command (see below):
Command = 04, Data Bytes = 1 to 25

%04%VIN1234567%

The VIN number can also be represented without a command. So, all alphanumeric bar codes without commands will be interpreted as VIN numbers.

VINNUMBER-ABCDE1234

Batch Reset	Command = 10, Data Bytes = 0
Batch Reset	*%10%%*
Parameter/Group:	Command = 11, Data Bytes = 1
Parameter A	*%11%0%*
Parameter B	*%11%1%*
Parameter C	*%11%2%*
Parameter D	*%11%3%*
Parameter E	*%11%4%*
Parameter F	*%11%5%*
Parameter G	*%11%6%*
Parameter H	*%11%7%*

Cell ID: Command 01-Data Bytes 4
%01%1234%

Channel ID: Command 02=Data Bytes 2
%02%34%

Controller Name: Command 03- Data Bytes 1 to 25
%03%air-bag%

Job Number: Command 05- Data Bytes 4
%05%9999%

Batch Size: Command 09 -Data Bytes 4
%09%0004%

Torque Min Limit: Command 21- Data Bytes 6
%21%012500%

Torque Max Limit: Command 22 - Data Bytes 6
%22%013000%

Torque Final Target: Command 23 -Data Bytes 6
%23%012750%

Angle Min: Command 25 -Data Bytes 5
%25%00010%

Angle Max: Command 26—Data Bytes 5
%26%00999%

Bar Codes (Continued):

Angle Final Target: Command 27 -Data Bytes 5

%27%00100%

Job Sequence Number: Command 42 - Data Bytes 5

%42%54321%

Parameter Set Name: Command 47 Data Bytes - 1 to 25

%03%parama%

Job Number: Command 05 - Data Bytes 4

%05%9999%

Torque Units: Command 48 - Data Bytes 1

InLb- ***%48%0%***
FtLb - ***%48%1%***
Nm - ***%48%2%***

Exacta Direction: Command 49 - Data Bytes 1

Positive - ***%49%0%***
Negative - ***%49%1%***
Both - ***%49%2%***

Exacta Mode: Command 50 - Data Bytes 1

Peak - ***%50%0%***
Residual - ***%50%1%***