

SIEMENS

FIELD MANUAL

FLOWMETER ETHERNET CONFIGURATION

1015N-2EFM-2

FOR TECHNICAL ASSISTANCE

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FLOWMETER ETHERNET CONFIGURATION 1015N-2EFM-2



This equipment contains components that are susceptible to electrostatic discharge (ESD). Please observe ESD control measures during the handling and connection process.

Field Manual 1015N-2EFM-2
September 2006

For use with Operating System
Software Version 3.00.00 or later

Prepared By _____ Date _____

Engineering _____ Date _____

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FLOWMETER ETHERNET CONFIGURATION

1. INTRODUCTION

There exists a near infinite number of different possible Ethernet configurations for connecting a flowmeter to a data collection station. Fortunately, there are only three configuration parameters which must be supplied by the customer for any installation. These parameters are IP Address, Gateway IP Address, and Network Mask. Gateway IP Address is optional in some configurations. Network Mask has one of several default values if not specified. And, the IP address is always mandatory.

This configuration may be done at the installation site. On-site configuration is advantageous in that it provides immediate pass/fail results, but the procedure can be long and cumbersome. In-house configuration can be performed much more quickly, but cannot be guaranteed to work on-site without further testing.

The customer's Network Administrator for the installation site must supply this information. To better understand which parameters may be optional or defaulted, we will consider two generic Ethernet configurations, LAN and WAN – Local Area Network and Wide Area Network. Many other configurations are possible.

Here are definitions for some of the network terminology. With generalization comes inaccuracy. This is not meant to be a tutorial in TCP/IP. Be aware that there are exceptions and there exists further elaboration on these definitions of terms.

1.1 DEFINITIONS

NIC – Network Interface Card. In the flowmeter, this is the module supplied by Lantronix.

MAC Address – The hardware address of the NIC, based on the manufacturer code and serial number of the part. This number is unique throughout the world and never changes. The MAC Address needs to be known only during configuration of the NIC, otherwise mostly ignored. A MAC Address has the form of six hexadecimal numbers, 00-FF separated by dashes. To configure a meter, the MAC address for that meter must be known.

IP Address – The assigned address of the NIC. This is a mandatory configuration parameter. It has the form of four decimal numbers, 0-255, separated by dots. Some addresses and address ranges have a special purpose. A flowmeter may never have an IP Address which ends in 0 or 255. IP Addresses are unique for the LAN or WAN on which they reside (defined shortly).

Subnet – A group of IP addresses which share the same prefix (in general). For example, 192.168.1.1 and 192.168.1.2 are IP Addresses contained within the same subnet. A subnet is further qualified by the use of a mask, which determines how the IP Addresses are compared.

Subnet Mask – The bits used to determine if two IP Addresses are in the same subnet. To clarify, the IP Address is examined in hex or binary form. 192.168.1.1 equals C0.A8.01.01 expressed in HEX. To answer the question, is 192.167.1.1 in the same subnet as 192.168.1.1, we need to know which part of the address to compare. 192.167.1.1 is C0.A7.01.01. If we have a subnet mask of FF.FF.0.0, then we first must “AND” the mask with each address and compare the results. C0.A7.0.0 is not the same as C0.A8.0.0 and will reside in a different subnet. If the

subnet mask is changed to FF.0.0.0, then both 192.168.1.1 and 192.167.1.1 will reside in the same subnet.

A Subnet Mask may be specified as four HEX numbers, 00-FF, separated by dots, or by four decimal numbers 0-255 separated by dots, or a by a single number 0-32 which represents the number of left justified bits in the mask, usually specified with a “/” slash. For example, 192.168.1.1/24 is an IP Address of 192.168.1.1, which has an associated Subnet Mask of 24 bits, or 255.255.255.0 or FF.FF.FF.00.

Subnet mask is a configuration parameter which is determined entirely by the Network Administrator and the networking hardware on which the flowmeter will be installed. There are four default values for three classes of IP Address ranges, labeled “Class A” thru “Class C.” If the IP Address begins with 0-127, it’s Class A and has a Subnet Mask of /8. 128-191 are Class B addresses with a Subnet Mask of /16. And, 192-223 is Class C with a Subnet Mask of /24. *These are called the “Classfull Mask” default values.*

LAN – Local Area Network. A network or part of a network which is mostly contained within a single building or group of buildings. IP Addresses on a LAN are usually assigned values of 10.0.0.0 - 10.255.255.255, 172.16.0.0 - 172.31.255.255, 192.168.0.0 - 192.168.255.255 for security reasons. All networking hardware which is connected to the Internet provides security for the building by isolating these LAN address ranges from the WAN. A LAN or Subnet on the LAN is often connected to a single Router (defined below). A device on the WAN may not initiate contact with a device on a LAN without going through a **Firewall** or **NAT** (defined below).

WAN – Wide Area Network. Commonly referred to as The Internet. IP Address ranges on the WAN as assigned by a central organization, which are not in the LAN address range. A flowmeter may only be assigned a WAN address if the installation site has been assigned to operate within that address range. WAN addresses differ from LAN addresses, in that the assignment of a Network Mask and Class assignments are usually not assigned at the installation site, but rather from the service provider to the site. WAN addresses are unique throughout the entire world and an installation site has a scarce few number of them. LAN addresses must be unique only for the building in which they reside (i.e., they may be duplicated in a second building). A WAN address may be accessed from any part of the world, while a LAN address may only be accessed from within the same building.

HUB – This is nothing more than a signal splitter, which allows more than one IP Addressable device to be wired into a single port of a Router. TCP/IP Traffic is assumed to flow from its single “upstream” port and split amongst every “downstream” port at the same time. Traffic between the downstream ports may be possible if the devices are operating at the same transmission rate or if the HUB has a translator. HUBs are usually dumb devices with no associated IP Address, but there are exceptions. HUBs and Routers are sometimes referred to as “**Nodes**” on the network.

Router – Similar to HUB, there are generally one or two upstream ports and many downstream ports. A Router in a large network will have a great amount of intelligence built into it. It can perform several functions, but its primary function is to direct traffic coming in and out of it based on a criteria, such as IP Address destination and priority. The Router learns the route from one IP address to another IP address. Routers speak to other Routers on the network to negotiate the shortest distance between two nodes, or re-route traffic in the event of a failure. They often have at least one upstream IP Address and one downstream IP Address.

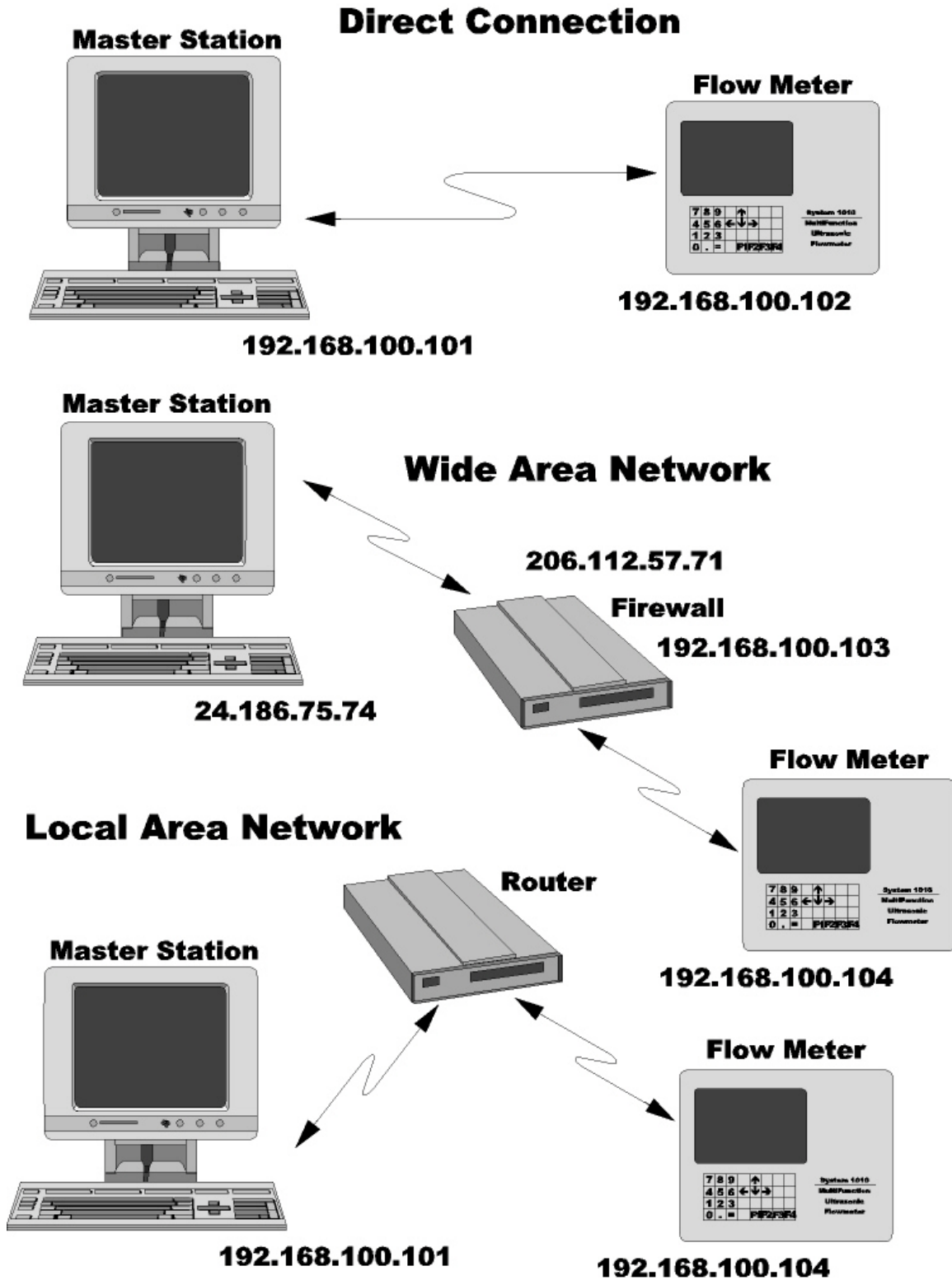
Switch – A Router which can effectively combine many low speed ports into a single high speed port with little or no loss of bandwidth is known as a Switch.

NAT – When a Router is used to re-direct traffic destined for a particular IP Address by substituting a different one, it is known as a Network Address Translator or a NAT. This is often done to connect many LAN addresses to the WAN using a single IP Address in the WAN range. A NAT acts as a one-way traffic portal to protect the LAN from unwelcome intrusion.

Firewall – A NAT is a Firewall. A Router which adds additional filtering intelligence is designated as the Firewall for the network. It is not possible for a WAN address to initiate communications with a LAN address through a simple NAT. A Firewall must be programmed to allow two-way communication.

Gateway – A [default] Gateway is the IP Address to which traffic is directed if another route could not be found. Routers act as Gateways, but have their own default Gateway path. If traffic enters a Router, it will leave by the shortest route based on its destination IP Address. If the path is not known, it exits through the default Gateway. If an IP Addressable device on the network cannot establish communications with another device, it will send traffic to its default gateway, which is usually the closest router. The Default Gateway is a configuration parameter which is optionally specified by the Network Administrator if there is a Firewall, Router, Switch, or NAT in-between the flowmeter and data collection station.

1.2 CONFIGURATIONS



1.2.1 DIRECT CONNECTION

In the proceeding illustration, there are three methods of connecting a flowmeter to a data collection station at the installation site. If there is a direct connection between the flowmeter and the station, they will reside on the same Subnet as defined by their respective Subnet Masks. The IP Address of the flowmeter must be specified by the Network Administrator. There must exist a Network Node in-between the data collection station and the flowmeter or the electrical equivalent of a Null Modem. This is necessary since both devices will attempt to transmit on the same wire of the cable.

In a point-to-point direct connection, there exists many instability problems, especially with Microsoft Windows. A HUB or Router is often used. If a HUB is used, care must be taken that the data collection station operate on the same speed as the flowmeter, which is 10MHz, or that the HUB have a speed translator for its downstream ports. A Router will always work better than a HUB by increasing stability, providing a constant IP address on the network, and performing any necessary speed translation.

If the IP Address for the flowmeter is in the WAN address range, it is strongly suggested that the Subnet Mask be left as the default for the Class of IP Address used, usually Class C. The Gateway need not be specified.

If the IP Address for the flowmeter is a LAN Address, the Subnet Mask may default to the Classfull Mask, but it is always a good idea to double-check with the Network Administrator. OSI Software, for example, runs two Subnets on the same LAN and uses a non-standard Network Mask.

1.2.2 WIDE AREA NETWORK

If the flowmeter is attached to a LAN, but access to it is permitted from the WAN, there will be a NAT, Firewall, Switch or Gateway (e.g., a Router) in-between. The Network Mask is double-checked to be correct for the LAN configuration. The IP Address is always specified. However, in this example, a Default Gateway is not optional. The Default Gateway will be the IP Address of the closest Router. Without this information, traffic will often flow in only one direction and the configuration will remain incomplete.

1.2.3 LOCAL AREA NETWORK

This will be the most common type of installation. The IP Address will be specified as a LAN address. The Network Mask should be double-checked to see if it's the Classfull Default or if has been configured to be something non-standard. All traffic will flow to/from one downstream port of the closest router to the collection station on another downstream port of the router.

If the flowmeter and the data collection station exist on the same Subnet, no Default Gateway needs to be specified. If they exist on different Subnets, the Default Gateway may need to be configured as the IP Address of Router closest to the flowmeter.

2. FLOWMETER CONFIGURATION

The following procedure sets up the communication parameters between the Model 1010 flowmeter and the 1015N-5M. Note that the following are not the ModBus or NZ parameters.

- Use the <Up/Down> arrows and scroll to [Meter Facilities].
- With [Meter Facilities] shown use the <Right> arrow to access the sub menu.
- Use the <Up/Down> arrows and scroll to [RS-232 Setup].
- Use the <Right> arrow to access the RS-232 setup parameters. Use the <Right> arrow to choose the parameters shown below. Use the <Up/Down> arrows to scroll to desired choice.
- Press the <Enter> key to select.

Baud Rate = 9600

Parity = Odd

Data Bits = 7

Line Feed = No

Network ID = 0 (Note: This is not the MODBUS ID.)

RTS Key Time = 0.2

2.1 TABLE GENERATION

For each flowmeter, a table needs to be generated which contains the following information:

- 1) **Serial Number** of the meter – taken from the sticker inside the housing.
- 2) **MAC Address** of the NIC – taken from the sticker on the Lantronix module. Lantronix provides two stickers with each module. One sticker may be placed on the interior of the meter. If both stickers are lost, the method of recovering the MAC Address is laborious.
- 3) **IP Address** – This is the address, as specified by the Network Administrator, designated for each flowmeter.
- 4) **Subnet Mask** – Defaults to the Classfull Mask for the IP Address, but should be specified in most cases. For WAN addresses, the Subnet Mask should be standard for the class.
- 5) **Default Gateway** – In the most common installation, this will be the IP Address of the router to which the flowmeter is connected. This parameter is optional most of the time.

From the factory, the Lantronix module is configured for an IP Address of 0.0.0.0 and will search for a DHCP server on the network when it is powered up. This allows the flowmeter to have dynamically assigned configuration parameters, which is not useful for this application.

There are three parts to the flowmeter configuration:

- 1) Insure that the latest firmware is installed in the Lantronix module.
- 2) Install a known, working configuration baseline from an Intel HEX format file.
- 3) Enter the correct IP Address, Subnet Mask, and Default Gateway for the specific flowmeter.

The last step is fairly easy and can be explained step-by-step over the telephone with a customer, if necessary.

2.2 CONFIGURING ETHERNET COMMUNICATIONS OPTION FOR THE 1010 FLOWMETER

Ethernet communication with the 1010 flowmeter is done by the addition of an RS-232 to TCP/IP protocol conversion module, the CoBox-Micro manufactured by Lantronix <http://www.lantronix.com/> This module provides ISO Layer-3 functionality, providing Telnet, http, tftp, as well as many other protocols as defined in their documentation. For our application, we are concerned with only Telnet and tftp.

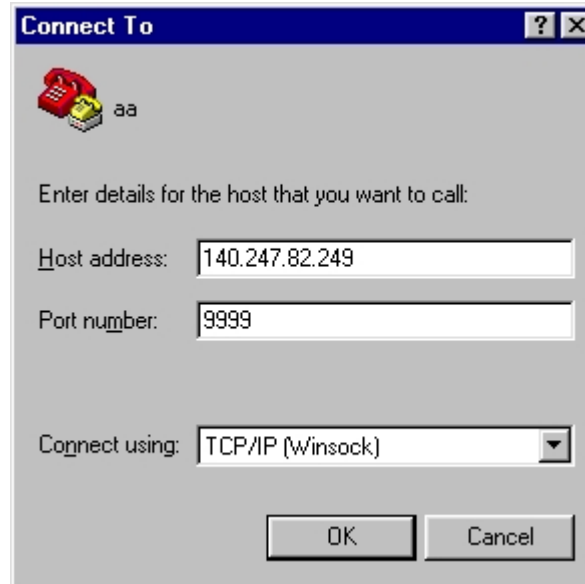
Remote access to the flowmeter has been conventionally done by connecting a laptop to the RS-232 terminals of the flowmeter. Configuration is accomplished through the keypad or by using HyperTerminal™, provided with the Windows operating system. With the Lantronix module attached, the RS-232 port is no longer available. HyperTerminal™ may be configured to use TCP/IP over Ethernet by selecting the ‘TCP/IP’ option instead of the “Direct to Com1” setting.

As an alternative, Windows provides a Telnet application by running “Telnet.” Third-party Telnet clients may be used as well, provided they have VT-100 emulation, which may need to be configured to force single-character packet transmission.

Hyper-Terminal Configuration



Change “Connect using” to TCP/IP.



Enter the IP Address of the flowmeter and the configuration port number. Port 9999 is usually the configuration port and 3001 is the data port. These port numbers may change if a different Lantronix module is used, for example: the CoBox-Mini vs. the CoBox-Micro. If the data port, 3001 is selected, HyperTerminal™ will behave as if the flowmeter was connected directly to the RS-232 port. The difference will be that the laptop will need to be connected to the flowmeter over the Ethernet using a network cable.

2.2.1 CONFIGURING PORT NUMBERS AND IP ADDRESSES

As a minimum, the configuration port number and the data port number will be known and will usually be the same: 9999 and 3001 for the CoBox-Micro modules. The IP Address will vary and will be unique for every flowmeter at a particular installation site. This IP Address must be supplied by the customer. The IP Address is stored in non-volatile RAM in the Lantronix module and is unaffected by the flowmeter settings (unless the module is damaged or replaced). HyperTerminal™ will not be able to connect with the flowmeter until the flowmeter's IP Address is set; however, the IP Address is set by using HyperTerminal™. This paradox is resolved by misleading Windows, and associating the physical address of the Lantronix module with the flowmeter's desired IP Address by use of the “arp” table modification command.

2.2.2 THE MAC ADDRESS

The physical, or MAC Address, is the hardware serial number of the module. Lantronix places a sticker on the module with this unique 12-digit code, which is essential to getting the communications configured. In some installations, it may be necessary to partially disassemble the flowmeter to read the MAC Address if the sticker is not clearly visible. A typical MAC Address looks like 00-20-4A-54-52-8E. The first few digits indicate the Lantronix company; the last few digits are unique for every module manufactured. If the MAC Address cannot be determined, it is recommended to simply replace the unknown module with that of a known MAC Address and return the unmarked module to the Controlotron Engineering department.

To recover a lost MAC Address, perform a Serial Port Login. The module needs to be re-wired to supply 5V and ground to CON1 pins 1 and 2, then connect to the TX/RX/GND pins of the RS-232

port on pins 4, 3, and 2 to the laptop. Power up the Lantronix module while holding down a lower case “x” on the keyboard. You have 1 second to enter three x’s after the module powers up. This should bring you into Setup Mode, which will display the MAC Address of the module. It is advisable to not loose the sticker.

2.3 ELECTRICAL CONNECTION

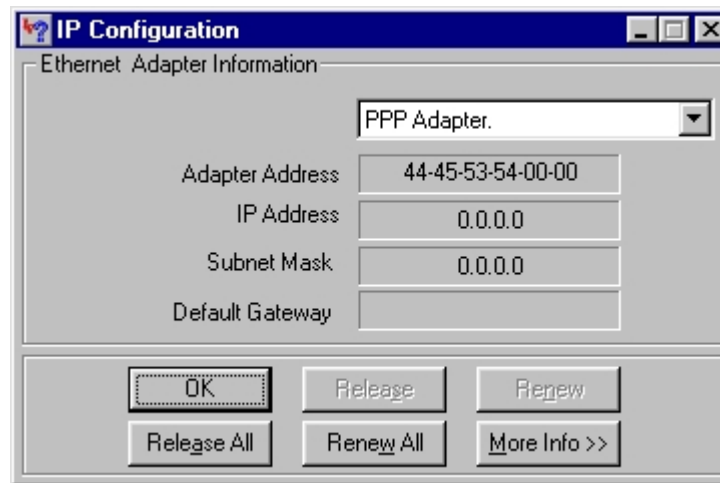
Before Windows can be configured to open communications with the flowmeter, an electrical connection needs to be established. There are four basic configurations for connecting a laptop computer to the flowmeter. Not all options will be available at every site.

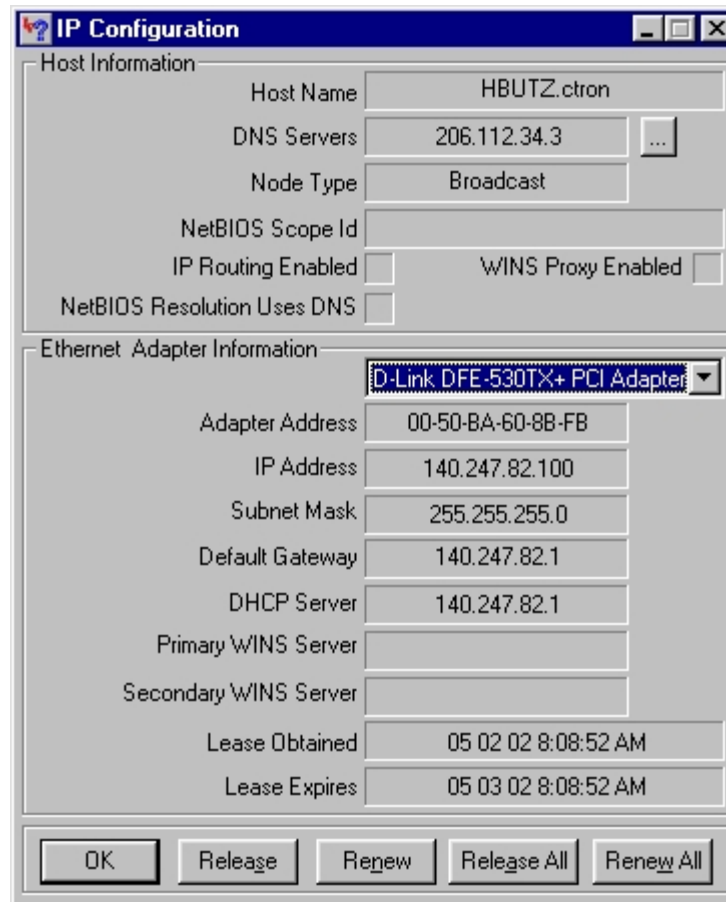
- 1) Remote access from Hauppauge, New York (Controlotron Corporation). On occasion, the flowmeter may be connected directly to the Internet. This is not usually done and will not work unless the customer’s network is configured specifically for this purpose. If properly configured, the laptop can be plugged into any available Internet drop in Hauppauge to communicate with a site anywhere in the world. This configuration is more useful for simple diagnostics of a flowmeter that is already in operation or to see if the flowmeter is “alive.”
- 2) Remote access on the customer’s network. The flowmeter can be accessed from just about any Internet drop at the customer’s site. There are a few requirements for this to work. The laptop computer must be assigned an IP address by the customer’s network, either manually or automatically (via DHCP). And, any intervening firewalls and routers at the site must be configured to allow communication on ports 9999 and 3001. If a NAT (Network Address Translator) is used, the gateway of both the laptop and the Lantronix module must be configured to the address of the NAT. Further, the gateway required for the flowmeter to operate normally might differ from what is required to configure it. The laptop will also be located at a point some physical distance from the flowmeter. This is not a desired option.
- 3) Direct connection using a cross-over cable. Similar to an RS-232 “Null-Modem” cable, a short CAT-3, 5, 5a, 6 or better network cable can be connected directly between the laptop and the Lantronix module. This works best with Windows 95/98™ and not so well with Windows NT/2000™. The cable is connected with everything powered off. Power up the meter first, then the laptop immediately following. For this connection to work properly, the network adapter must be pre-configured for a Static IP Address in the same “subnet” as the flowmeter, usually set to the customer’s router address or firewall address which the flowmeter will be connected to. The gateway of the laptop is set to the desired IP Address of the flowmeter. If the cable is disconnected, or if the connection is disturbed, everything will need to be powered down and rebooted. This is not the most stable option for communications, but is good to have if all else fails. It requires changing the network settings in the laptop as well. And, a special crossover cable has to be obtained.
- 4) Private LAN (Local Area Network) using a Router or HUB. The easiest and most stable form of communication is by creating a small LAN with a router, such as the LinkSYS 4 port switch. The router is set to a static IP Address in the same subnet as the desired IP address of the flowmeter, usually the IP Address of the customer’s gateway. Then, a cable is connected between one of the open ports of the router and the flowmeter and another cable between the router and the laptop. *Note: The WAN side of the router does not need to be configured.* A router is preferable to a HUB, as a router provides diagnostic feedback, dynamic IP Addressing, and cable speed translation.

2.4 SETTING THE IP ADDRESS OF THE LAPTOP

Looking at the best option for configuring the meter, we will assume that a router will be used. Our laptop computers, like all the computers on our network, are configured to be dynamically configured by use of a DHCP (Dynamic Host Configuration Protocol). The biggest advantage of using a router is that the network configuration of the laptop does not need to be changed.

- 1) Power everything up and connect the laptop to one of the LAN ports on the router.
- 2) Run the program “WinIPCfg”. The top box will most likely display “PPP” (Point to Point Protocol) for the modem. *Note: You never care what the PPP settings are; and, Windows will probably issue a warning if you attempt to modify the network settings for PPP.*
- 3) Click on “More Info>>” and change the adapter to the Ethernet adapter of the laptop, usually the only other option.

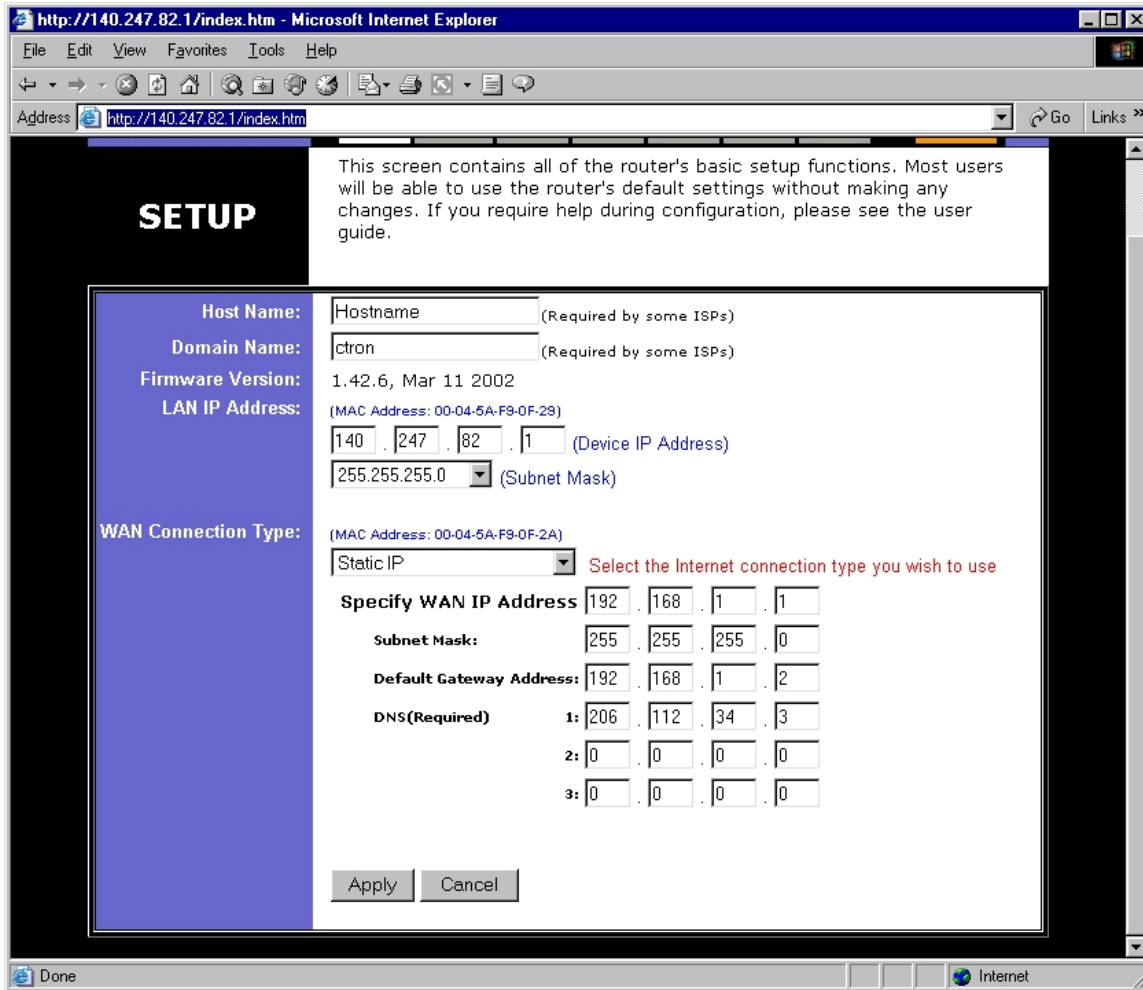




Host Information	
Host Name	HBUTZ.ctron
DNS Servers	206.112.34.3
Node Type	Broadcast
NetBIOS Scope Id	
IP Routing Enabled	<input type="checkbox"/>
WINS Proxy Enabled	<input type="checkbox"/>
NetBIOS Resolution Uses DNS	<input type="checkbox"/>
Ethernet Adapter Information	
Ethernet Adapter	D-Link DFE-530TX+ PCI Adapter
Adapter Address	00-50-BA-60-8B-FB
IP Address	140.247.82.100
Subnet Mask	255.255.255.0
Default Gateway	140.247.82.1
DHCP Server	140.247.82.1
Primary WINS Server	
Secondary WINS Server	
Lease Obtained	05/02/02 8:08:52 AM
Lease Expires	05/03/02 8:08:52 AM

Unless the IP Address of the LinkSYS router has been changed from its default, your DHCP Server will be set to 192.168.1.1 and your IP address to 192.168.1.100. The first device plugged into the router defaults to .100 and the second device to .101, while the router itself will reside on .1. If an IP Address is not assigned automatically, click on “Release” then “Renew” to get the attention of the DHCP server in the router. In this example, the IP Address of the router was changed to the gateway information provided by the customer, in this case 140.247.82.1.

So, this becomes the first configuration item. Configure the router to be the customer’s gateway. If the gateway is not known, set the router’s IP Address to the same subnet as the desired IP address of the flowmeter. That is, set the first three numbers the same, while the third to be different – usually .1. Our desired IP address is 140.247.82.249 for the flowmeter, 140.247.82.1 for the router, and 255.255.255.0 for the Subnet Mask. Open MIE (Microsoft Internet Explorer) and configure the router by entering “http://140.247.82.1” (displayed as our DHCP server and gateway). The router may ask for a name and password. For name and password, leave the name blank and enter “admin” for the password. You will see the following screen (see next page):



These values may be entered exactly as they appear here. The only important settings are the LAN IP Address and the Subnet Mask. If these values need to be changed, click on “Apply,” close MIE on the laptop, then in WinIPCfg, click on “Release” and “Renew” to obtain a new IP Address. This should normally be a .100 address similar to the router’s IP. Getting to this point demonstrates that the laptop and the router are properly configured. The next step will be to configure the flowmeter to operate on the customer’s network.

2.5 FIGHTING WITH THE DHCP SERVER

The router’s DHCP server will assign .100 to the laptop by default. If you need to configure the flowmeter for .100, you will need to tweak the DHCP server on the router to a different value, like .101 – or, just move it out of the way, like .254. Do not set the laptop’s IP Address to .0 or .255, as some of these values are reserved. To tweak the DHCP starting address, open the router configuration, DHCP tab, and enter a value (like 200) into the Starting IP Address field. Then, release/renew the laptop’s IP Address.

2.6 SETTING THE IP ADDRESS OF THE FLOWMETER

Connect a second network cable between the router and Lantronix module in the 1010 flowmeter after noting the module’s MAC Address. The module should have one green LED lit before the cable is plugged in, two lit after. One green LED will blink while the laptop is communicating with the data port. Or, the red/yellow LED’s will flash while connected to the configuration port.

Lantronix modules are factory configured to look for a DHCP server, such as provided in the router. In this event, the router's DHCP client table will display the module as having an IP Address of .101. If the module has already been configured with a static IP Address, it will not show up in the router's client table. In either case, the IP Address can be overridden and reset by faking an ARP (Address Resolution Protocol) entry in Window's routing table, which includes the MAC Address of the flowmeter.

If the IP Address of the flowmeter is known and does not need to be configured, skip the IP configuration and enter its address in HyperTerminal™, port 3001 for the data port. Otherwise, manually enter an ARP entry into Windows by opening a DOS prompt and typing the following:

```
arp -s 140.247.82.249 00-20-4a-54-2b-44
```

where: 140.247.82.249 is the desired IP Address of the flowmeter and 00-20-4a-54-2b-44 is the MAC Address of the Ethernet module.

This will allow you to open the flowmeter on 140.247.82.249, even if that is not really the IP Address of the flowmeter. *This is an important detail, since new flowmeters do not have a default IP Address.*

From HyperTerminal™, given the values in this example, attempt to open 140.247.82.249 on port 1. This should produce an error message within a few seconds saying "Cannot connect" or "Connection Refused." If nothing happens for longer than about 3 seconds, then communication has not been established with the flowmeter. If the router can be opened in MIE, but opening port "1" of the flowmeter takes more than a few seconds, there is a communication problem between the router and the flowmeter – probably because the MAC Address or IP Address has been mistyped. In the DOS window, try typing "ping 140.247.82.1" and "ping 140.247.82.249" to see where the communications are breaking down.

If the port 1 connection is immediately refused, establish a new connection on port 9999. You should see the Lantronix configuration greeting message:

```
*** Lantronix Universal Device Server ***  
Serial Number 5411076  MAC address 00:20:4A:54:2B:44  
Software version 04.5 (011025)
```

```
Press Enter to go into Setup Mode
```

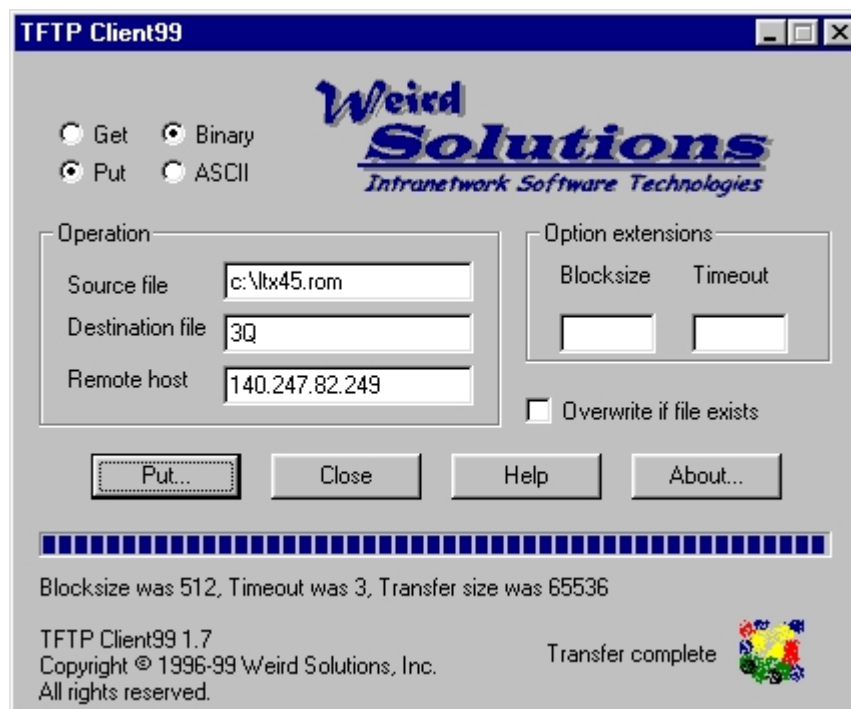
You will have five seconds to press either <CR> for Configuration Mode or "M" for Monitor Mode before the flowmeter disconnects. Note the Software version, which may need to be updated to the latest revision on a new installation.

- 1) The first thing you want to do is establish a static IP Address for the flowmeter so the "arp" command will no longer be necessary. Windows will behave in a more predictable fashion after this IP Address is set. On a crossover cable, if the IP Address is not correctly set following this procedure, everything will need to be powered down and rebooted.
- 2) From the menu, select "0" – Server Configuration.
- 3) Enter the desired IP Address of the module as "140" <cr> "247" <cr> "82" <cr> "249" <cr>.
- 4) Enter 'Y' <cr> to set the gateway address, which should be set to that of the router. (The router at this point should be set to .1 or to some number specified by the customer).
- 5) Enter 24 bits for the Network Mask, which is the same as specifying 255.255.255.0. This will work for the vast majority of installations, but the Network Mask may vary and the gateway is optional on some networks.

- 6) Most of the configuration settings in option “1” – Channel configuration will not need to be changed. Set the baud rate to that of the flowmeter’s RS-232 port. Leave the “Remote IP Address” set to 0.0.0.0 – this is not associated with the IP Address of the flowmeter. It is preferable to set all of the other settings from “Monitor Mode” using an Intel Hex file provided by the Controlotron Engineering department. This will provide a uniform, documented configuration for all the flowmeters at a site. These settings are primarily for TCP/IP communications for the specific customer’s site.
- 7) Enter “9” to save the settings to non-volatile RAM and disconnect.

2.7 UPLOADING THE LATEST LANTRONIX FIRMWARE (Optional)

Lantronix provides a tftp client for Windows and a firmware file to upgrade the modules. This can be done at any time after the IP address has been configured. The settings used to upgrade the CoBox-Micro should look like this:



A progress bar is displayed on the bottom of the screen. If the upload stops, continue to click on “Put” and see if that fixes the problem. If the upload was successful, the Lantronix module will automatically reset and begin running the latest version firmware.

2.7.1 LANTRONIX ETHERNET CONFIGURATION

After the IP Address has been set and the latest firmware has been upload (optional), then all the remaining Ethernet parameters can be set in the Lantronix module. These settings will be provided by the Controlotron Engineering department in the form of an Intel HEX file. This HEX file contains all the settings of the Lantronix module, including the IP Address. There will be a discrepancy between what is written and what is read back from the configuration, as some parameters may not be overridden by writing this file. The IP Address must be set from the configuration screen, as described previously. Configuration via the Hex file will overwrite the IP Address.

The best method for the remaining configuration items is to Telnet into port 9999 and press “M” (upper case) instead of <CR>. You will receive a command prompt of “0>”, 0 indicating the error

result of the last function performed. Pressing <CR> by itself will produce a “9>” prompt, indicating a command syntax error. The commands of interest are “SC,” “GC,” and “QU” for Set Configuration, Get Configuration, and Quit, respectively. All commands are entered in upper case. Copy the Intel HEX format file into the Windows clipboard buffer by opening the file in notepad. An example of what this file will look like is:

```
:200000108CF752F900001814000000008CF7520158020100B90B000000000000C00000140D
:20002010000088002000000000000000000000000000000000000000000000000000000002E
:200040104C0200001227000000000000C00000000000000000000000000000000000000049
:18006010000000000000000000000000000000000000000000000000000000078
:00000001FF
```

At the “0>” or “9>” prompt, enter “SC” for Set Configuration and press <CR>. The cursor will wait for further input.

Use the paste function of HyperTerminal™ or Telnet to upload the hex file. Wait about a 20-30 seconds for a “0>” prompt to appear.

To read back the settings, type “GC.” Copy and paste this configuration into notepad and save. The first line will probably show a discrepancy due to the IP Address setting, which is normal.

```
:200000108CF752F9000018FF000000008CF7520158020100B90B000000000000C000003BFB
:20002010000088002000000000000000000000000000000000000000000000000000000002E
:200040104C0200001227000000000000C00000000000000000000000000000000000000049
:18006010000000000000000000000000000000000000000000000000000000078
:00000001FF
```

Fine-tuning of the Ethernet parameters can be made from the menu after re-connecting. The setting of the RS-232 configuration needs to match that of the flowmeter for the data port communications to operate. Be sure to reset the correct IP Address and gateway after this step.

2.7.2 FLOWMETER REMOTE ACCESS

Disconnect from port 9999 and open port 3001. If the serial ports are set correctly, TCP/IP communication with the flowmeter should now behave exactly the same as having an RS-232 connection – with one important exception. Most applications will incorporate an idle timer on the RS-232 port, ranging from 6 to 59 seconds. If no activity is sensed for this period of time on port 3001, the Telnet session will terminate automatically. This could become annoying, especially if the disconnect timer is set to a very low number.

It may become necessary to temporarily change the disconnect timer to prevent the Telnet session on port 3001 from disconnecting. (Note: This is an optional procedure.) Enter the parameter settings from the menu on port 9999 and select Channel 1 configuration:

NOTE: From port 9999 the following values must be set for Ethernet communication.

```
Change Setup : 0 Server configuration
               1 Channel 1 configuration
               5 Expert settings
               6 Security
               7 Factory defaults
               8 Exit without save
               9 Save and exit
Your choice ? 1

Baudrate (9600) ?
I/F Mode (58) ?
Flow (01) ?
Port No (03001) ?
ConnectMode (C0) ?
Remote IP Address : (000) .(000) .(000) .(000)
Remote Port (00000) ?
DisConnMode (00) ?
FlushMode (80) ?
Pack Cntrl (02) ?
DisConnTime (00:20) ?
```

“DisConnTime (00:20) ?” indicates that a 20 second disconnect timer is in effect. It is not advisable to disable it entirely by setting the timer to zero, as communication to the flowmeter could be lost for hours or days at a time. At the (00:20) prompt, leave the seconds field alone and enter “5”<CR><CR> which will add five minutes to the disconnect timer.

It is important to return this value back to its original setting by coming back the configuration screen and entering “0”<CR><CR> which should zero out the minutes field and keep the seconds field alone – assuming that the timer was set and was at a value between 1 and 59 seconds.

2.7.3 ETHERNET SPEED

Most Ethernet hardware will negotiate speed for 10 or 100 Mbps. The Lantronix module is 10 Mbps only. If it is connected to a router which cannot step down to the slower speed, a connection will not be possible. HUBs present a more mysterious communication failure. They are designed to connect 10 or 100 Mbps devices to an “uplink” port – however, if mixed speed communications is done on the downlink side, some HUBs have a design flaw which prevent them from doing a speed translation from one port to another.

Using a router will prevent speed translation problems between the laptop and the flowmeter, where a HUB may not. If a speed translation problem is suspected between the customer’s LAN and the flowmeter, the router’s WAN port can be configured to the desired meter IP address, the flowmeter and the laptop placed on a different subnet, pass-through ports from the WAN configured to forward to the flowmeter, and diagnostics can be done from the laptop. This goes beyond the scope of this Ethernet configuration document.

APPENDIX A

Flowmeter Command Reference

COMMAND DESCRIPTION

SRPT { xxxxxxxx } *where: xxxxxxxx is an optional hex bit field*

Instructs all active channels to build and buffer a datalogger message containing specified data items. If no hex bit field is specified, items presented will be selected from the Datalogger Data List screen. If neither is specified, all data items will be present in the buffered message. For the format of the hex bit field, see **DLBITS**.

Successful completion of this command will produce no output. Use **DUMP** to display the resultant buffered message.

default: Field data output defaults to that specified in the Datalogger setup.

Related Command: **DUMP, DLBITS, REPORT**

DUMP { n } *where: n is the channel number*

Sends the buffered datalogger message to the RS-232 port. If no channel is specified, all channels are sent to the RS-232 port.

default: All active channels

example:

```

HB1      ,06.23.2003,13.22.17, 0.000, 0.000,MBTU/HR , 0.02      , MBTU      ,
18.375,  18.036, GAL/MIN, 7.433085e1,I3/S,      58.83, KGAL,
1403.32,VS(M/S), 32.00,TSF, 31.94,TRF, 0.06,TDF,  61,S,    1,A,-----,
0.00786,dt(uS),  0.000,Off
HB2      ,06.23.2003,13.24.30,-0.016,-0.017,MBTU/HR ,-0.85      , MBTU      ,
50.576,  50.796, GAL/MIN, 2.080254e2,I3/S,      159.33, KGAL,
1402.62,VS(M/S), 30.21,TSF, 30.87,TRF,-0.66,TDF,  61,S,    3,A,---R-----,
0.02171,dt(uS),  0.000,Off

```

Related Command: **SRPT, DLBITS, REPORT**

MENUCHK { x } *where: x is any character*

Sends the full keypad selectable menu list and selected choices for the meter to the RS-232 port. If any character is specified, will send all available choices instead of current user selected choice(s).

default: Menu list and selected choices

SCREEN

Sends a snapshot of the text displayed on the LCD display to the RS-232 port. This display the text portions only, not any graphical display or waveform.

LOGCLR

Clears the entire datalogger stored in memory.

Related Command: `LOGGER`

REMAKE

Returns the last makeup status code for all liquid channels to the RS-232 port. Return codes are as follows:

All Systems:

- 0 - Restart
- 1 - Low signal strength
- 2 - Excessive aeration during e/l makeup
- 3 - e/l or rx window too late
- 4 - e/l or rx window too early
- 10 - Empty (ALC) error measured

Alice Only:

- 5 - Excessive data re-registration
- 6 - Excessive tn re-registration
- 7 - Makeup timer cycle invoked
- 8 - Recovery from wait empty
- 9 - PHIFXD error measured
- 11 - Correlation buffer contents error
- 12 - No correlations error

example:

```
remake
```

```
0 0
```

Related Command: `MAKEUP`

CLRDYN

Clears all saved memory. This command cannot be undone.

Related Command: (keypad) F4 part 2

MEMO [message] *where: message is any text*

Appends the text message to the datalogger stored in memory.

LS

Lists a description of saved sites to the RS-232 port. The format is:

Site ID Creation Date Part-number Software Version Meter Type Site Type#

example:

```
ls
HB1          06.18.03 12.14 1010EN06 3.01.03  Clamp-on Energy [1]
HB2          06.18.03 12.14 1010EN06 3.01.03  Clamp-on Energy [1]
```

BOOTLOAD

Invokes the Flash ROM Bootloader via the RS-232 port using XModem. All site data is lost. This command cannot be undone. Requires confirmation. It is suggested to set the baud rate to 38400/n/8 before using this command.

DP [path] where: *path* is 1 to maximum active channel number

Sends plot coordinates and signal metrics to the RS-232 port in the following format:

Sample number Up Value Down Value

DLBITS

Displays the HEX bit weight for the datalogger field names for the particular meter. This number is used in the **SRPT** command. The field selection mask is simply the 'OR' of all selected items. **note:** Evocation of this command will yield a different and unique response based upon the configuration and type of meter. This example is for reference only.

example:

```
dlbits
Site Id          00000001
Date             00000002
Time             00000004
Average Energy   00000008
Energy Rate      00000010
Energy Total     00000020
Path Flow        00000040
Flow             00000080
Average Flow     00000100
Raw Flow         00000200
Total            00000400
Path Vs          00000800
Vs               00001000
Ts               00002000
Tr               00004000
Td               00008000
Path Valc        00010000
Valc             00020000
```

Aeration	00040000
Path Alarms	00080000
Alarms	00100000
Path Delta T	00200000
Analog Inputs	00400000

Related Command: DUMP, SRPT

INFO

Displays Operating System Part Number, Revision, Compile CODE, ROM Checksum, and Network ID. (Compile CODE) is the datetime stamp for the operating system's compile.

example:

`info`

```
1010EN06-3.01.03 052803-1552      02DCE227      0
```

LOGGER

Sends the contents of the datalogger memory to the RS-232 port.

Related Command: LOGCLR

REPORT

Instructs all active channels to build and buffer a datalogger message and then outputs the buffered message. All active channels are reported. The report destination and data items are selected via the keypad menus.

example:

```
HB1      ,06.23.2003,13.22.17, 0.000, 0.000,MBTU/HR , 0.02      , MBTU      ,
18.375,  18.036, GAL/MIN, 7.433085e1,I3/S,      58.83, KGAL, 1403.32,VS (M/
S), 32.00,TSF, 31.94,TRF, 0.06,TDF,  61,S,    1,A,-----,
0.00786,dt (uS),  0.000,Off
HB2      ,06.23.2003,13.24.30,-0.016,-0.017,MBTU/HR ,-0.85      , MBTU      ,
50.576,  50.796, GAL/MIN, 2.080254e2,I3/S,      159.33, KGAL, 1402.62,VS (M/
S), 30.21,TSF, 30.87,TRF,-0.66,TDF,  61,S,    3,A,---R-----,
0.02171,dt (uS),  0.000,Off
```

Related Command: SRPT, DUMP

SITE { n } *where: n is 1 through maximum active channels*

Generates a site report for the specified channel, displaying all configurable items.

default: currently displayed channel

Related Command: MENUCHK

RECALL [n Sitename] *where: n is 1 through maximum active channels, Sitename is the name of a stored site.*

Recalls the saved site name from meter's slot 'n' and loads it into currently active channel. If the site's technology does not match that which is being recalled, this command will not work. *Used only by FlowTalk program.*

SAVE [n] *where: n is 1 through maximum active channels*

Saves the active channel to meter's slot 'n'. *Used only by FlowTalk program.*

CLRTOT [n] *where: n is 1 through maximum active channels*

Clears the totalizer for the specified channel number. Note that only the system channel of multi-beam meters provides totalization. This channel is 3 for dual beam systems and 5 for four beam systems.

Related Command: CLRBAT, NOTOT

CLRBAT [n] *where: n is 1 through maximum active channels*

Clears the batch totalizer for the specified channel number.

Related Command: CLRTOT, NOTOT

NOTOT [n] *where: n is 1 through maximum active channels*

Inhibits the totalizer and batch totalizer for the specified channel number. If the totalizer is already inhibited, this command will re-enable it.

Related Command: CLRTOT, CLRBAT

DATE [date] *where: date is in MM.DD.YY format*

Sets the Flow Data Computer date to the specified month, day, and year.

Related Command: TIME

TIME [time] *where: time is in HH.MM.SS format*

Sets the Flow Data Computer time to the specified hours, minutes, and seconds.

Related Command: DATE

EMPTY [n value] *where: n is 1 through maximum active channels, value is the desired empty value for the channel.*

Sets the specified empty value for the specified channel to the specified value.

Related Command: DAMPING, ZERO

DAMPING [n value] *where: n is 1 through maximum active channels, value is the desired time average damping for the channel.*

Sets the specified time average damping for the specified channel to the specified value.

Related Command: EMPTY, ZERO

VS [n [< | >]] *where: n is 1 through maximum active channels, followed by the character '<' or '>'*

Increments or decrements the specified channel by 1 vs cycle. '>' will increment vs, '<' will decrement vs.

MAKEUP [n] *where: n is 1 through maximum active channels*

Forces an in-process makeup for the specified channel number.

Related Command: REMAKE

MENU { n } *where: n is a timeout specified in minutes*

Enters remote menu mode. Menu mode may be exited by successively pressing the left-arrow key until the screen clears and returns to the command entry level. Configuration and data screens may be toggled by using the ^L (Control-L) keystroke. Successive data screens may be displayed by pressing the down-arrow or up-arrow keys.

If no keystrokes are pressed within the timeout period specified, the screen will clear and menu mode will exit to the command entry level. User has full access to the meter's menu using arrow and other keys while in this mode.

default: 3 minutes timeout

ECHO [on | off]

Turns on and off keystrokes echoed back to the terminal connected to the RS-232 port.

Related Command: LF

LF [on | off]

Turns on and off line feeds appended onto each line sent to the terminal connected to the RS-232 port.

default: off after <F4> Reset.

Related Command: ECHO

ZERO [n value] *where: n is 1 through maximum active channels, value is the desired zero offset for the channel.*

Sets the specified zero value for the specified channel to the specified value.

Related Command: EMPTY, DAMPING

MTABLE [n m] *where: n is 1 through maximum active channels, m is the number of table entries.*

See System 1010 UniMass Table manual addendum (1010FMA-15) for MTABLE command usage or the UniMass section in the appropriate System 1010 flowmeter manual.

NETWORK SYNTAX

For the purpose of addressing several meters on a common RS-232 or RS-485 bus, each meter may be assigned a unique Network ID. When a Network ID is assigned, all serial communications must be done with data packets. The packet data format and specification is proprietary and is preemptive of any other network methodology.

Network mode may also be used to provide a reliable data transport mechanism for point to point communication.

NETWORK PACKET DESCRIPTION:

BBDDSS[data]CC<CR>[<LF>][<NULL>] where:

BB is two character ASCII hex character count of (DD+SS+data)

DD is two character ASCII hex destination network ID

SS is two character ASCII hex source network ID

[data] is optional ASCII data

CC is two character ASCII hex checksum of characters
DD+SS+data

<CR> is ASCII 13

<LF> is an optional ASCII 10

<NULL> is optional padding

The checksum 'CC' is calculated by $\sum (D + D + S + S + \sum data_i) \wedge 255$

Example: **11AF00TIME 16.32.03C1<CR>11AF00DATE 12.26.95BA<CR>**

DATA TRANSPORT:

Responses to network packets follow the same syntax as query packets. For example: **0A0100report5D** is a 10 byte packet to address 1 from address 0 with the payload of "report". A typical response may look like:

**D80001HB1 ,2EF2,31E, 0.001, 0.001,MBTU/HR , 0.49 , MBTU , 19.311, 19.595,
GAL/MIN, 8.082454e1,I3/S, 721.95, KGAL, 1406.61,VS, 32.00,TSF, 31.91,TRF,
0.09,TDF, 61,S, 3,A,7FF,S, 0.00837,dt(uS), 0.000,Off5F<CR> D80001HB2
,2EF2,31E,-0.015,-0.015,MBTU/HR ,-10.40 , MBTU , 48.346, 48.343, GAL/MIN,
1.982330e2,I3/S, 1982.71, KGAL, 1406.62,VS, 30.25,TSF, 30.88,TRF,-0.63,TDF, 61,S,
5,A,7F7,S, 0.02067,dt(uS), 0.000,OffB4<CR>**

This is two packets, 216 bytes each, to address 0 from address 1 with a payload of a response to the "report" command.

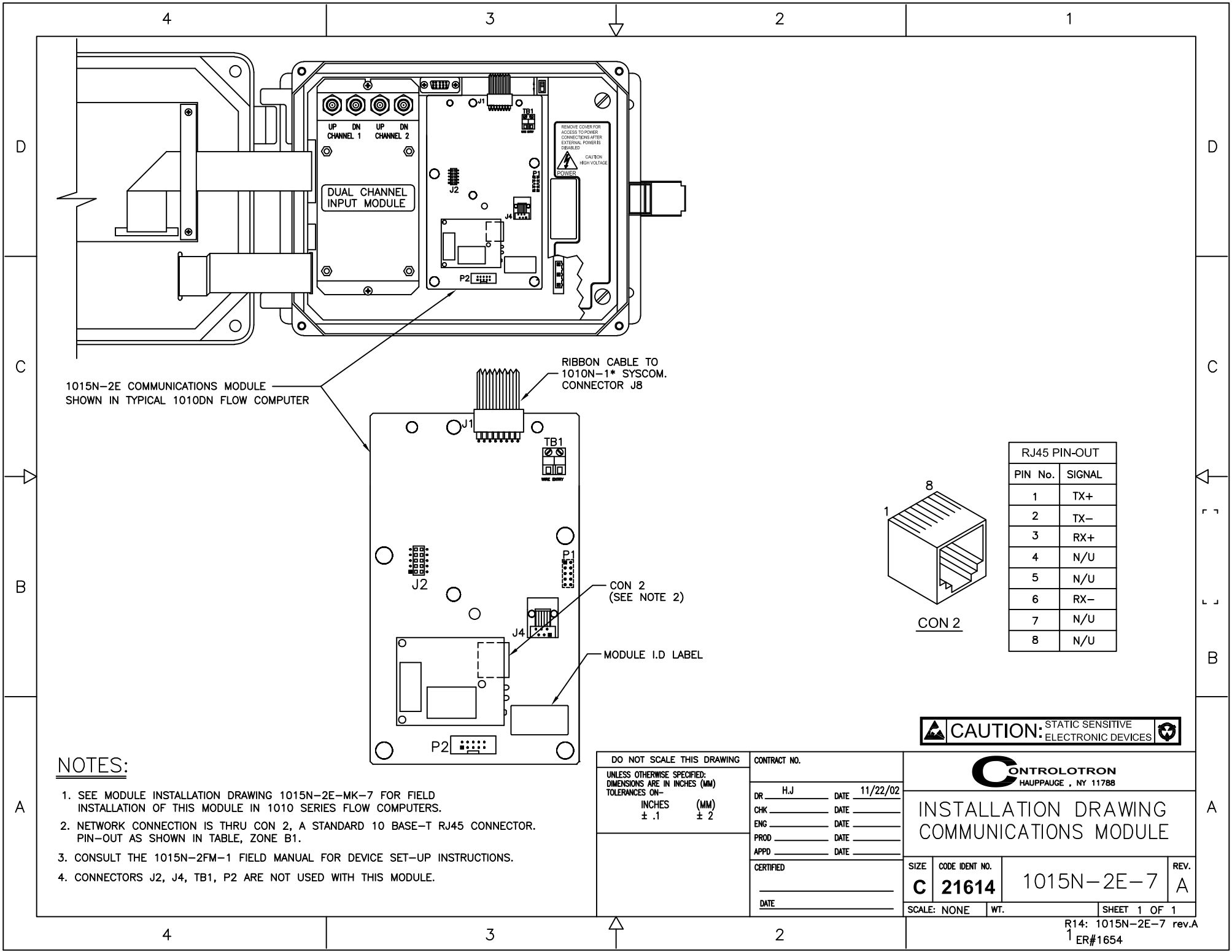
The first data field is a 4 digit hex encoded date. The date is encoded as follows:

$\text{date_of_month} + (\text{month} * 32) + ((\text{year} - 1980) * 512)$. In this example, 2EF2 represents July 18th, 2003.

The second data field is the number of minutes past midnight. In this example, 31E is 798 minutes past the hour, or 13:18.

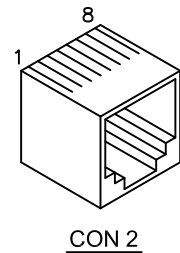
The status of the reporting channel is represented by a 3-digit hex number. In this example, 7FF and 7F7 represent the status. They are bit encoded as follows:

- 0x001 - spacing
- 0x002 - Zeromatic channel fault
- 0x004 - empty
- 0x008 - hi/lo flowrate
- 0x010 - fault
- 0x020 - aeration or turbulence (GAS)
- 0x040 - memory
- 0x080 - makeup
- 0x100 - interface
- 0x200 - pig detect
- 0x400 - channel/path enable



1015N-2E COMMUNICATIONS MODULE SHOWN IN TYPICAL 1010DN FLOW COMPUTER

RIBBON CABLE TO 1010N-1* SYSCOM. CONNECTOR J8



RJ45 PIN-OUT	
PIN No.	SIGNAL
1	TX+
2	TX-
3	RX+
4	N/U
5	N/U
6	RX-
7	N/U
8	N/U

NOTES:

1. SEE MODULE INSTALLATION DRAWING 1015N-2E-MK-7 FOR FIELD INSTALLATION OF THIS MODULE IN 1010 SERIES FLOW COMPUTERS.
2. NETWORK CONNECTION IS THRU CON 2, A STANDARD 10 BASE-T RJ45 CONNECTOR. PIN-OUT AS SHOWN IN TABLE, ZONE B1.
3. CONSULT THE 1015N-2FM-1 FIELD MANUAL FOR DEVICE SET-UP INSTRUCTIONS.
4. CONNECTORS J2, J4, TB1, P2 ARE NOT USED WITH THIS MODULE.

CAUTION • STATIC SENSITIVE • ELECTRONIC DEVICES

CONTROLTRON
HAUPPAUGE, NY 11788

INSTALLATION DRAWING
COMMUNICATIONS MODULE

DO NOT SCALE THIS DRAWING		CONTRACT NO.	
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON-		DR. H.J.	DATE 11/22/02
INCHES	(MM)	CHK. _____	DATE _____
± .1	± 2	ENG. _____	DATE _____
		PROD. _____	DATE _____
		APPD. _____	DATE _____
		CERTIFIED _____	
		DATE _____	

SIZE	CODE IDENT NO.	REV.
C	21614	A
1015N-2E-7		
SCALE: NONE	WT.	SHEET 1 OF 1

4

3

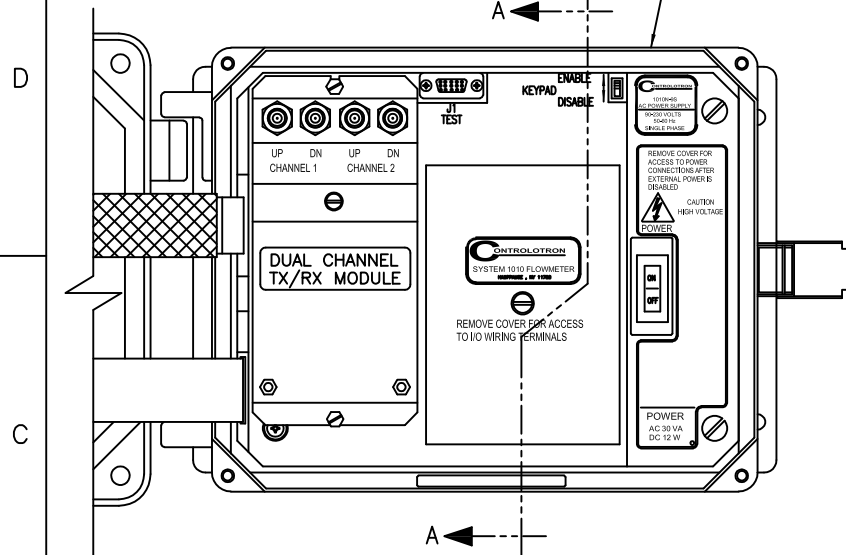
2

1

1010N OR 1010DN SERIES FLOW COMPUTER

START VIEW

FINISH VIEW



SERIAL DATA CABLE (SEE NOTE 10)

P/N 1010-206 COVER, I/O MODULE

P/N 1010N-2* I/O MODULE

P/N 402S12 CAPTIVE SCREW, 6-32 x 1 1/4" LG.

P/N MS15795805 FLATWASHER, #6

P/N 829SS20 CAPTIVE SCREW,

P/N 1010-247 COVER, ANALOG MODULE

P/N 1010-246 THREADED STANDOFF

P/N 1010N-5* ANALOG MODULE, ASS'Y

TWIST CABLE 180° FOR PROPER CONNECTOR MATING

J1 (SEE NOTE 10)

P/N 1010-446-1 COVER, I/O MODULE

P/N 1015N-2E COMMUNICATIONS MODULE

P/N 1010N-2* I/O MODULE

P/N 4006M07F09 CAPTIVE SCREW,

P/N 1010-447-1 STANDOFF, COVER MOUNT

P/N 1010-434-1 THREADED STANDOFF

P/N 1010-379 COVER, ANALOG MODULE

P/N 1010-246 THREADED STANDOFF

P/N 1010N-5* ANALOG MODULE, ASS'Y

DISASSEMBLY/ASSEMBLY PROCEDURE

DISASSEMBLY:

1. LOOSEN (1) CAPTIVE SCREW P/N 402S12 AND LIFT OFF I/O MODULE COVER P/N 1010-206.
2. LOOSEN (4) CAPTIVE SCREWS P/N 829SS0 AT CORNERS OF THE 1010N-2* MODULE AND CAREFULLY LIFT OUT THE MODULE, DISENGAGING IT FROM THE CONNECTOR ON THE 1010N-5* MODULE.
3. LIFT OFF THE SHIELD P/N 1010-247 COVERING THE 1010N-5* MODULE.
4. LEAVE THE 1010N-5* MODULE IN PLACE. CHECK TO ASSURE THAT THE (4) CORNER STANDOFFS P/N 1010-246 ARE SECURELY THREADED IN PLACE.

ASSEMBLY:

5. INSTALL SHIELD P/N 1010-379 SUPPLIED WITH THE 1015N-2E-MK1 MOUNTING KIT COVERING THE 1010N-5* MODULE. THIS SHIELD REPLACES 1010-247 REMOVED IN STEP 3 ABOVE.
6. REMOVE THE (4) CAPTIVE SCREWS P/N 829SS0 FROM THE 1010N-2* MODULE REMOVED IN STEP 2 ABOVE AND DISCARD. INSTALL STANDOFFS P/N 1010-434-1 FROM THE MOUNTING KIT IN THE VACANT POSITIONS.
7. INSTALL THE 1010N-2* MODULE, CAREFULLY ENGAGING THE CONNECTOR ON THE 1010N-5* MODULE BELOW. SECURE BY THREADING THE (4) STANDOFFS INSTALLED IN STEP 6 ABOVE WITH THEIR MATES ON THE 1010N-5* MODULE.
8. INSTALL THE 1015N-2E MODULE ATOP THE 1010N-2* MODULE, CAREFULLY ENGAGING CONNECTOR P1 ON THE 1015N-2E WITH ITS MATE P1 ON THE 1010N-2*. SECURE THE 1015N-2E BY ENGAGING ITS (4) CAPTIVE SCREWS WITH THE (4) STANDOFFS ON THE 1010N-2*.
9. INSTALL THE LARGE THREADED SPACER FROM THE MOUNTING KIT P/N 1010-447-1 THROUGH THE HOLE AT THE CENTER OF THE 1015N-2E MODULE INTO THE THREADED RECEPTACLE ON THE SHIELD P/N 1010-379 INSTALLED IN STEP 5.
10. CONNECT SERIAL DATA CABLE (STOWED ON WALL OF FLOW COMPUTER ENCLOSURE) TO J1 ON THE 1015N-2E MODULE. TWIST CABLE 180° TO ATTAIN PROPER CONNECTOR ORIENTATION.
11. AFTER WIRING IS INSTALLED (SEE DRAWING 1015N-2E-7) INSTALL COVER P/N 1010-446-1 FROM THE MOUNTING KIT AND SECURE BY ENGAGING CAPTIVE SCREW P/N 4006M07F09 (PREASSEMBLED TO COVER) WITH THREADED SPACER P/N 1010-447-1 INSTALLED IN STEP 9.

MODULE LOADING OPTION 1 : 1010N-5* WITH 1010N-2* IN 1010N/DN TYPE SYSTEM
USE MOUNTING KIT 1015N-2E-MK1

CAUTION: STATIC SENSITIVE ELECTRONIC DEVICES

CONTROLTRON
HAUPPAUGE, NY 11788

**ASS'Y, 1015N-2E MODULE
IN 1010 SERIES FLOW AND
ENERGY COMPUTERS**

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON-
FRACTIONS- DECIMALS- ANGLES-
+/- 1/64" XX+/-0.01 +/-0.30'
XXX+/-0.005

MATERIAL:

FINISH:

CONTRACT NO.

DR H.J DATE 11/26/02

CHK DATE

ENG DATE

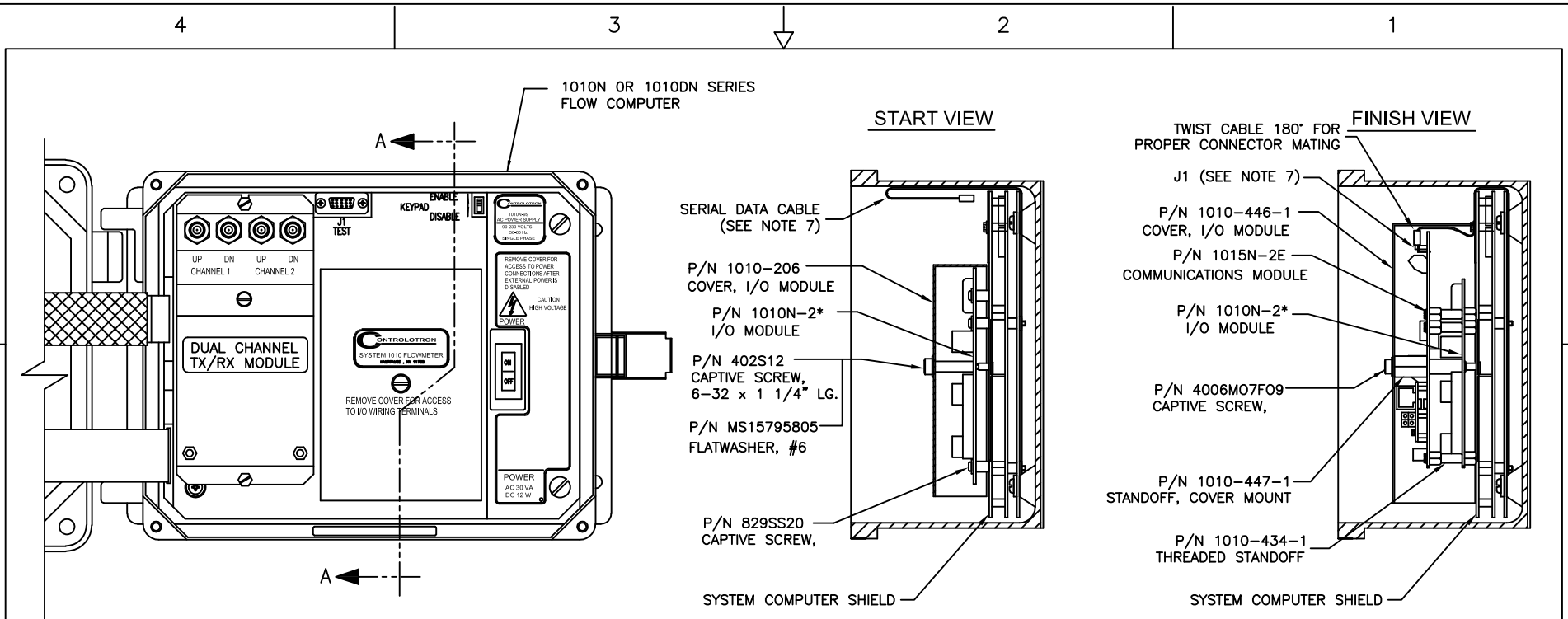
PROD DATE

APPD DATE

CERTIFIED

DATE

SIZE	CODE IDENT NO.	REV.
C	21614	1015N-2E-MK-7
SCALE: NONE	WT.	SHEET 1 OF 3



DISASSEMBLY/ASSEMBLY PROCEDURE

DISASSEMBLY:

1. LOOSEN (1) CAPTIVE SCREW P/N 402S12 AND LIFT OFF I/O MODULE COVER P/N 1010-206.
2. LOOSEN (4) CAPTIVE SCREWS P/N 829SS0 AT CORNERS OF THE 1010N-2* MODULE AND CAREFULLY LIFT OUT THE MODULE, DISENGAGING IT FROM THE CONNECTOR ON THE 1010N-1* SYSTEM COMPUTER MODULE.

ASSEMBLY:

3. REMOVE THE (4) CAPTIVE SCREWS P/N 829SS0 FROM THE 1010N-2* MODULE REMOVED IN STEP 2 ABOVE AND DISCARD. INSTALL STANDOFFS P/N 1010-434-1 FROM THE MOUNTING KIT IN THE VACANT POSITIONS.
4. INSTALL THE 1010N-2* MODULE, CAREFULLY ENGAGING THE CONNECTOR ON THE SYSTEM COMPUTER MODULE BELOW. SECURE BY THREADING THE (4) STANDOFFS INSTALLED IN STEP 3 ABOVE WITH THEIR MATES ON THE SYSTEM COMPUTER MODULE.
5. INSTALL THE 1015N-2E MODULE ATOP THE 1010N-2* MODULE, CAREFULLY ENGAGING CONNECTOR P1 ON THE 1015N-2E WITH ITS MATE P1 ON THE 1010N-2*. SECURE THE 1015N-2E BY ENGAGING ITS (4) CAPTIVE SCREWS WITH THE (4) STANDOFFS ON THE 1010N-2*.
6. INSTALL THE LARGE THREADED SPACER FROM THE MOUNTING KIT P/N 1010-447-1 THROUGH THE HOLE AT THE CENTER OF THE 1015N-2E MODULE, THROUGH THE SPACER ON THE 1010N-2* MODULE INTO THE THREADED RECEPTACLE ON THE SYSTEM COMPUTER SHIELD.
7. CONNECT SERIAL DATA CABLE (STOWED ON WALL OF FLOW COMPUTER ENCLOSURE) TO J1 ON THE 1015N-2E MODULE. TWIST CABLE 180° TO ATTAIN PROPER CONNECTOR ORIENTATION.
8. AFTER WIRING IS INSTALLED (SEE DRAWING 1015N-2E-7) INSTALL COVER P/N 1010-446-1 FROM THE MOUNTING KIT AND SECURE BY ENGAGING CAPTIVE SCREW P/N 4006M07F09 (PREASSEMBLED TO COVER) WITH THREADED SPACER P/N 1010-447-1 INSTALLED IN STEP 6.

MODULE LOADING OPTION 2 : 1010N-2* ONLY IN 1010N/DN TYPE SYSTEM
USE MOUNTING KIT 1015N-2E-MK2

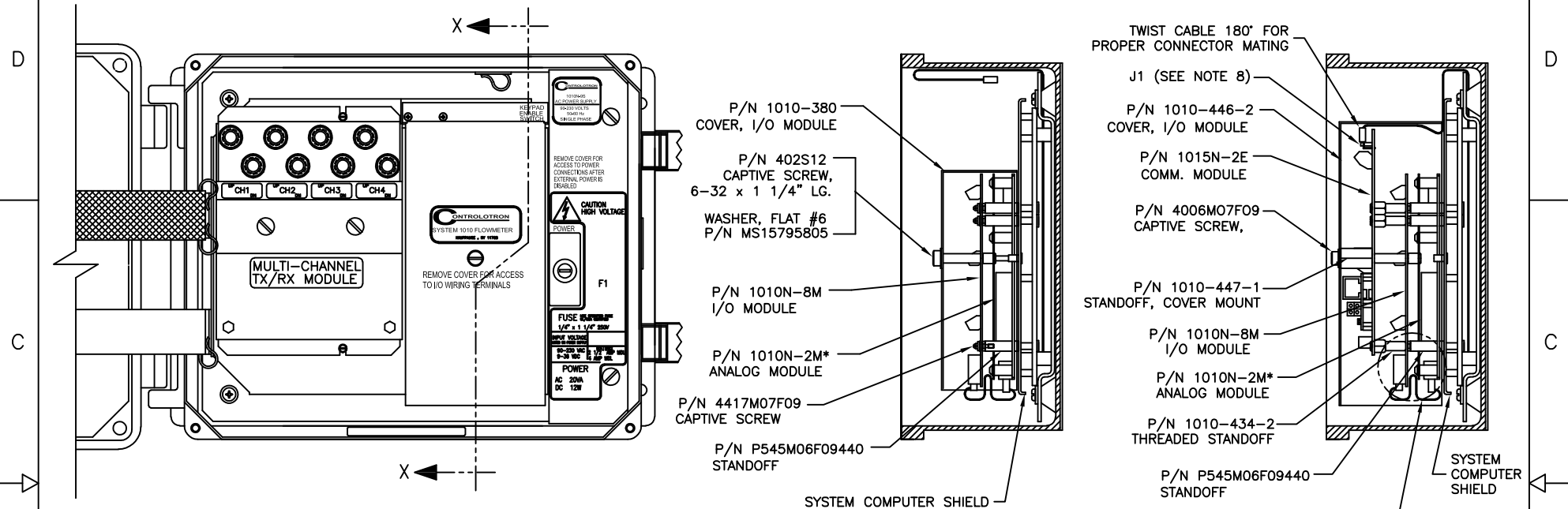


DO NOT SCALE THIS DRAWING UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON- FRACTIONS- DECIMALS- ANGLES- +/- 1/64" XX+/-0.01 +/-0°30' MATERIAL: FINISH:	CONTRACT NO. DR. H.J. DATE 11/26/02 CHK. DATE ENG. DATE PROD. DATE APPD. DATE	 ASS'Y, 1015N-2E MODULE IN 1010 SERIES FLOW AND ENERGY COMPUTERS		SIZE C CODE IDENT NO. 21614 1015N-2E-MK-7 REV. C	
	CERTIFIED DATE				SCALE: NONE WT. SHEET 2 OF 3
	1015N-2E-MK-7 rev.C CN#4589, CN#4823				

REVISIONS					
ZONE	LTR	ECN	DESCRIPTION	DATE	APPROVED

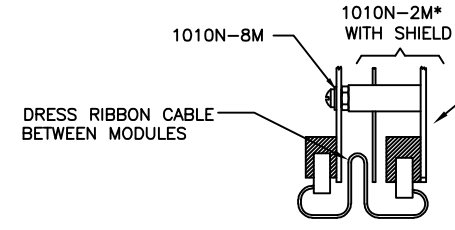
START VIEW

FINISH VIEW



- P/N 1010-380 COVER, I/O MODULE
- P/N 402S12 CAPTIVE SCREW, 6-32 x 1 1/4" LG.
- WASHER, FLAT #6 P/N MS15795805
- P/N 1010N-8M I/O MODULE
- P/N 1010N-2M* ANALOG MODULE
- P/N 4417M07F09 CAPTIVE SCREW
- P/N P545M06F09440 STANDOFF

- TWIST CABLE 180' FOR PROPER CONNECTOR MATING
- J1 (SEE NOTE 8)
- P/N 1010-446-2 COVER, I/O MODULE
- P/N 1015N-2E COMM. MODULE
- P/N 4006M07F09 CAPTIVE SCREW,
- P/N 1010-447-1 STANDOFF, COVER MOUNT
- P/N 1010N-8M I/O MODULE
- P/N 1010N-2M* ANALOG MODULE
- P/N 1010-434-2 THREADED STANDOFF
- P/N P545M06F09440 STANDOFF
- SYSTEM COMPUTER SHIELD



DISASSEMBLY/ASSEMBLY PROCEDURE

DISASSEMBLY:

1. LOOSEN (1) CAPTIVE SCREW P/N 402S12 AND LIFT OFF I/O MODULE COVER P/N 1010-380.
2. LOOSEN (4) CAPTIVE SCREWS P/N 4417M07F09 AT CORNERS (4) OF THE 1010N-8M MODULE AND CAREFULLY LIFT OUT THE MODULE, DISENGAGING IT FROM THE RIBBON CABLE CONNECTING IT TO THE 1010N-2M MODULE. SEE ZONE B1.
3. LEAVE THE 1010N-2M MODULE IN PLACE. CHECK TO ASSURE THAT THE (4) CORNER STANDOFFS P/N P545M06F09440 ARE SECURELY THREADED IN PLACE.

ASSEMBLY:

4. REMOVE THE (4) CAPTIVE SCREWS P/N 4417M07F09 FROM THE 1010N-8M MODULE REMOVED IN STEP 2 ABOVE AND DISCARD. INSTALL STANDOFFS P/N 1010-434-2 FROM THE MOUNTING KIT IN THE VACANT POSITIONS, REPLACING THE (4) 4-40 HEX. NUTS TO HOLD THE STANDOFF CAPTIVE.
5. INSTALL THE 1010N-8M MODULE, CAREFULLY ENGAGING THE RIBBON CABLE CONNECTOR AND DRESSING THE CABLE FOR THE BEST FIT. SECURE BY THREADING THE (4) STANDOFFS INSTALLED IN STEP 4 ABOVE WITH THEIR MATES ON THE 1010N-2M MODULE.
6. INSTALL THE 1015N-2E MODULE ATOP THE 1010N-8M MODULE, CAREFULLY ENGAGING CONNECTOR P1 ON THE 1015N-2E WITH ITS MATE P2 ON THE 1010N-8M. SECURE THE 1015N-2E BY ENGAGING ITS (4) CAPTIVE SCREWS WITH THE (4) STANDOFFS ON THE 1010N-8M.
7. INSTALL THE LARGE THREADED SPACER FROM THE MOUNTING KIT, P/N 1010-447-1 THROUGH THE HOLE AT THE CENTER OF THE 1015N-2E MODULE, THROUGH THE SPACER ON THE 1010N-8M MODULE INTO THE THREADED RECEPTACLE ON THE 1010N-2M MODULE SHIELD.
8. CONNECT SERIAL DATA CABLE (STOWED ON WALL OF FLOW COMPUTER ENCLOSURE) TO J1 ON THE 1015N-2E MODULE. TWIST CABLE 180' TO ATTAIN PROPER CONNECTOR ORIENTATION.
9. AFTER WIRING IS INSTALLED (SEE DRAWING 1015N-2E-7) INSTALL COVER P/N 1010-446-2 FROM THE MOUNTING KIT AND SECURE BY ENGAGING CAPTIVE SCREW P/N 4006M07F09 (PREASSEMBLED TO COVER) WITH THREADED SPACER P/N 1010-447-1 INSTALLED IN STEP 7.

MODULE LOADING OPTION 3 : 1010N-8M WITH 1010N-2M* IN 1010MN TYPE SYSTEM
USE MOUNTING KIT 1015N-2E-MK3

CAUTION • STATIC SENSITIVE • ELECTRONIC DEVICES

DO NOT SCALE THIS DRAWING UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON- FRACTIONS- DECIMALS- ANGLES- +/- 1/64" XX+/-0.01 +/-0'30" MATERIAL: FINISH:	CONTRACT NO. DR H.J DATE 11/26/02 CHK _____ DATE _____ ENG _____ DATE _____ PROD _____ DATE _____ APPD _____ DATE _____ CERTIFIED	 ASS'Y, 1015N-2E MODULE IN 1010 SERIES FLOW AND ENERGY COMPUTERS	
	CODE IDENT NO. C 21614		
NONE		3 OF 3	