Installation & Operating Instructions for Med Touch Series Area, Master & Combination Alarm Systems

Master Alarm

Area Alarm

Combination Alarm

Features & Benefits

The Tri-Tech Med Touch combination area and master alarm panel digitally displays gas pressure (1 psi increments), monitors and displays normal and alarm conditions from up to 128 remote medical gas source signals, and provides alarm conditions as required by the latest edition of NFPA 99 for up to 16 medical gases. The base alarm without Ethernet or Bacnet communication options is ETL listed to UL 1069 and CSA C22.2 # 205 Signal equipment. Transducers & DISS risers are included for area alarm gas boards. Transducers may be installed remotely or in the back box. Pressure switches and DISS union check valve connectors are sold separately.

- **Five year parts and one year labor limited warranty***
- 2.85" LCD touch screen displays up to 8 normal and alarm conditions for pressure switch sensor inputs
- 2.85" LCD touch screen displays up to 8 normal and alarm conditions and provides a digital pressure display for up to 4 transducer sensor inputs
- 2.85" LCD touch screen displays normal and high/low alarm conditions for one 4 – 20 mA sensor input
- The LCD touch screen allows all alarm programming and set up to be done without the use of tools
- A green normal or red alarm condition for each gas services confirms the condition for each individual gas service
- Emergency preparedness instructions - Med Touch alarm panels allow users to set up customized instructions for each alarm signal, to appear on the screen when the signal is in alarm
- Up to 128 signal points in a single panel
- Wireless (minimal low voltage wiring) models available (wireless feature for master signal points only)
- Last event history (per gas board /signal point)
- Made in the U.S.A.
- NFPA, ISO and ISO CHILE pre-loaded gas 'labels'
- English, English/French and English/Spanish pre-loaded languages
- Editable text and alarm 'labels'
- Self-contained unit - Designed for ease of installation and service
- Self-diagnostic and error message display for ease of maintenance
- Audio and visual alarm indicators
- Bright easy to read LCD displays – clearly visible in both day and night lighting conditions
- Constant display and monitoring of each gas
- User programmable high/low set points on transducer and 4 – 20 mA sensor input boards
- Dry contacts provided on the CPU module for general fault condition covering entire panel
- Hinged frame for easy accessibility
- Color coded displays
- Alarm history display of previous alarm conditions
- Hinged frame for easy accessibility
- Color coded labeling
- Wireless (minimal low voltage wiring) models available

*** See Terms and Conditions, Document No. 99-0477, on our Website at: www.tri-techmedical.com. For complete details**.

Additional features:

- Individual user programmable remote signal alarm points to accept NO or NC signals, or may be disabled. Factory preset to accept Normally Closed signals
- LCD indicators (Green) confirms normal status, (Red) indicates abnormal condition
- Menu of NFPA 99 master alarm signals for quick, easy selection
- Gas specific transducer master signal boards. An error message will be displayed if incorrect sensor or no sensor is attached.
- Transducer master signal boards shall be capable of displaying gas readouts in PSI, kPa, BAR, inHg, or mmHg.
- Alarm repeat feature is factory set at 10 minutes, and is adjustable or may be turned off.
- User programmable high/low set points on transducer master boards

In addition, each Area Alarm Module shall incorporate the following features:

- Does not require re-calibration
- Gas specific sensor with DISS nut & nipple. An error message will be displayed if incorrect sensor or no sensor is attached
- Shall be capable of displaying gas readouts PSI, kPa, BAR, inHg, or mmHg.
- Gas alarm repeat feature is factory set at 10 minutes, and is adjustable or may be turned off

The following options shall be able to be added to the panel at the time of order or after installation;

- **Optional Ethernet module**. This module may be added to any alarm panel. It will provide the following features:
  - Webserver – allows a remote user access to the alarm's webpage – viewing a graphic image of the alarm with all signal conditions, pressure & event / history log information
  - Text notification of alarm conditions (up to 5 addresses)
  - Event / history log – maintains a rolling list of the 100 most recent alarm condition events and a file of the 1,000 most recent alarm events and is downloadable through embedded web pages
  - Modbus interface with Ethernet connectivity

- **Optional BACnet module.** - Available for master and area/master combination alarms only. The Ethernet module must be installed in the alarm to use the BACnet module. Will provide the following features: provides a Modbus to BACnet gateway to interface to a BACnet building management system through Ethernet connectivity.

Contents

Features & Benefits ---------- 2
Introduction ---------- 4
Major components ---------- 5

Alarm Panel Installation ---------- 6

Rough-In Box Installation ---------- 6
Wiring/AC ---------- 7
Plumbing the riser extension tubes ----- 8
Installing the hinges ---------- 9
Installing the alarm front panel --------- 9
Wiring alarm front panel ---------- 10
Installing the transducers (not remote) - 10
Installing the transducers (remote) ----- 11
Connecting transducer wiring ---------- 12
Wiring remote devices (dry contacts) -- 13
Wiring remote devices (transducers) --- 14
Wiring remote devices (4-20mA)------- 15
Wiring general fault (dry contacts) ----- 16
Power on ---------- 17

Alarm Displays & Functions -------- 18
Button module displays & functions --- 18
Gas (Area) module ---------- 19
Alarm conditions ---------- 19
Emergency instructions (gas module) -- 19
Master module (dry contacts) ---------- 20
Emergency instructions
(master modules) ---------- 20
Master module (transducer inputs) ----- 20
Master module (4 – 20 mA input) ------ 20

Alarm Operation ---------- 21
Silencing the alarm ---------- 21
Repeater Delay ---------- 21
Testing the alarm ---------- -21
Gas (Area) modules ---------- 21
Master module (dry contacts) ---------- 21
Master module (transducer inputs) ----- 22
Master module (4 – 20 mA input) ------ 22
Ethernet module ---------- 22
BACnet gateway module ---------- 22

Programming the Alarm ---------- 23
Accessing the Program Mode ---------- 23
High & Low Alarm Pressure set points 24
Master points (N/O or disable) ---------- 24
Master point NFPA labels ---------- 24
Repeater Delay ---------- 25
Units of Measure ---------- 25
Digital Calibration ---------- 25
Com ID ---------- 25
Gas Service ---------- 26
Color Code Standard, Language &
Latching/Non-Latching ---------- 26
View Screen ---------- 26
Text & E Text Gas (Area) ---------- 27
Text & E Text Master (dry contacts) --- 28
4-20mA Master Module ---------- 28
Ethernet/rabbit ---------- 29
MAC Address Option ---------- 29
Create Receive Connector ---------- 30-32
Programming the Ethernet/Rabbit Board 32-34
E mail text notifications ---------- 35-36
Rabbit board programing commands 37
Modbus interface ---------- 38
Website ---------- 38-39
BACnet interface ---------- 40-44

Appendix A Glossary of Terms ---------- 45

Appendix B Specifications ---------- 46

Appendix C Master Signal wire log ------- 47

Appendix D Master Alarm Signal listing - 48

Appendix E Wiring Diagram (AC and DC)
Standard Area or Master Alarm ---------- 49

Appendix F Wiring Diagram
Area Alarm Remote Transducers ---------- 50

Appendix G Wiring Diagram
(Master Equipment) ---------- 51

Appendix H Wiring Diagram
(Master Remote Transducer) ---------- 52

Appendix I Wiring Diagram
Master 4-20mA Signals ---------- 53

Appendix J Wiring Diagram
Ethernet Communication ---------- 54

Appendix K Wiring Diagram (AC and DC)
BACnet ---------- 55

Appendix L Wiring Diagram
BACnet Communication ---------- 56

Appendix M Text Message Carriers -------- 57-61

Appendix N Ethernet/Rabbit Board
Programming Log ---------- 62

Introduction

This manual covers the installation and operation of the Tri-Tech "T" series of Med Touch Alarm Systems. It applies to three different back boxes and front panel sizes that are described as 2 slot, 3 slot, and 5 slot. These panels can have a maximum of 4 modules in a 2 slot alarm, 8 modules in a 3 slot alarm, or 16 modules in a 5 slot alarm. Refer to our Submittal Data Sheet 99-0488 for Master Alarms, 99-0489 for Area Alarms and 99-0490 for Combination Alarms for details on the physical size and module options in each of these Alarm Systems. These can be found on our website at www.tri-techmedical.com and look under Pipeline Products to find the type of Med Touch Alarm Submittal Data (Specification) sheet needed.

The Tri-Tech Medical gas alarm system monitors the status of the medical gas distribution system and provides audible and visual indicators. The master alarm can be furnished with either Modbus or BACnet building management interface circuit board(s) to communicate status information to the building management system. Any type of alarm may be equipped with an optional Ethernet board which will; launch a website, send text notifications to five addresses, maintain a rolling history / event log of 100 recent events and a file of 1,000 events, and provide a Modbus interface. A BACnet interface option may be added to any master alarm with the Ethernet option. The Tri-Tech alarm system monitors the status of the medical gas sources in accordance with NFPA 99 and CSA Z7396.1.

The Tri-Tech Medical gas alarm system is an assembly comprised of a rough-in box, a front panel and transducers (if it is an area, combination or transducer master alarm).

Rough-in box
The rough-in box houses the power supply, fuse, on/off switch, and a terminal strip for electrical wiring. An isolated transformer reduces the 110V or 220V AC input to low voltage DC.

Front panel
The front panel includes enclosed printed circuit boards with programming circuitry.
The **Push Button module** includes a power on indicator, quick view information buttons, the silence button and an audible alarm.

The **Remote Signal dry contacts module**(s) can monitor up to 8 signals per circuit board. Multiple remote signal modules can be ordered in a single alarm which would be in communication with dry contact sensors. The signals can be configured to display an abnormal condition on either a normally closed (NC) or a normally open (NO) circuit. Each signal may also be turned off if it is not being utilized.

The **Remote Signal transducer contacts module(s)** can monitor up to 8 signals from 4 transducers per circuit board. Multiple remote signal modules can be ordered in a single alarm which would be in communication with transducer sensors. The signals can be configured to display an abnormal condition on either a normally closed (NC) or a normally open (NO) circuit. Each signal may also be turned off if it is not being utilized. The benefits of transducers over dry contacts are: improved safety (an alarm is immediately triggered when a transducer fails), greater accuracy / repeatability, ease of setting (push button vs mechanical adjustment) and lower cost in most cases.

The **Remote Signal 4–20 mA contacts module** monitors a single 4–20 mA transmitter. The user is able to program and name the units of measure represented by the bar graph generated by the module. The user is also able to set the high and low alarm set points

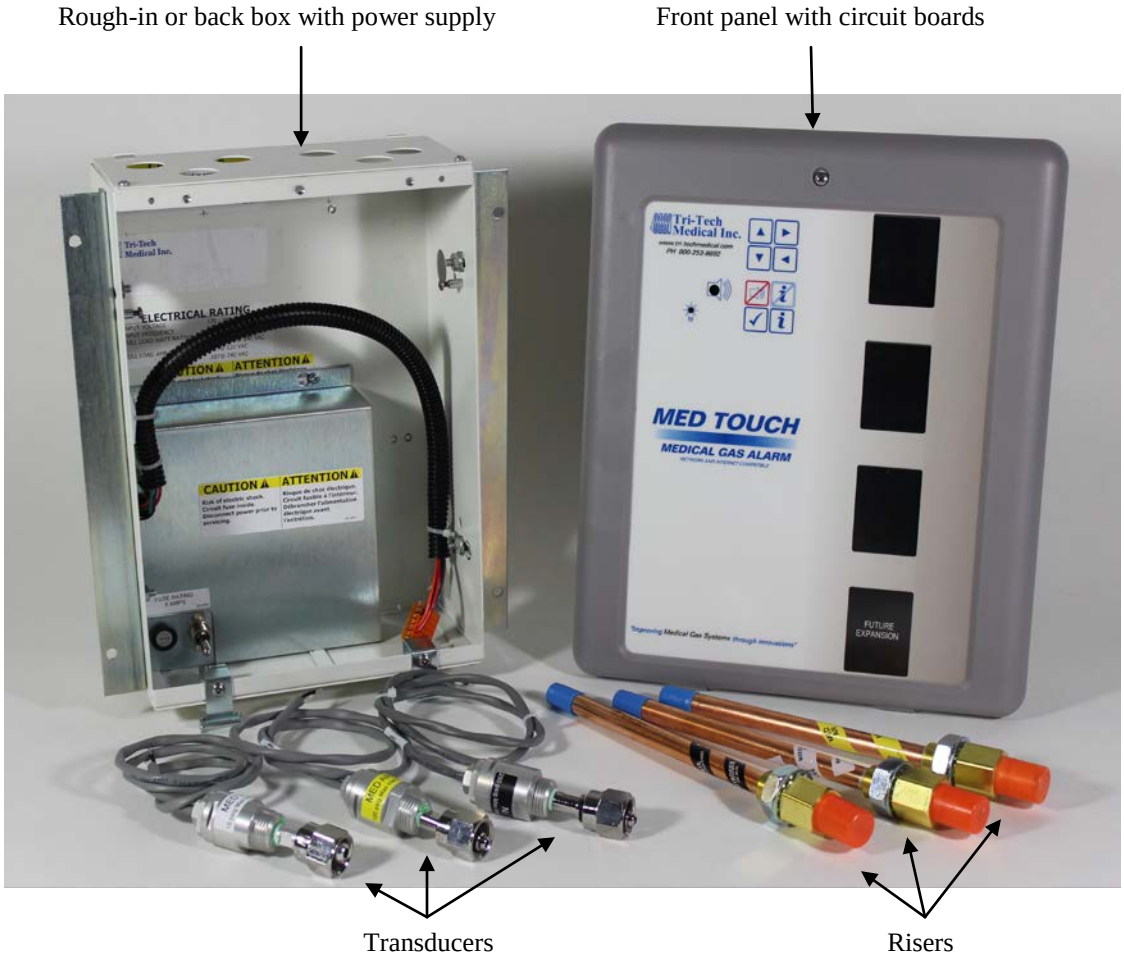
The **Gas (Area) module**(s) on the front panel are identified with gas specific, color coding (per NFPA 99 or CSA Z7396.1). The display shows the actual gas pressure along with an indication of the pressure being within the Normal, High or Low pressure range. The gas pressure may be displayed in PSI, In Hg, BAR or kPa. The unit is pre-programmed to display PSI / In Hg from the factory, but may be re-programmed in the field to display BAR or kPa. In addition the display will indicate System and Program failures. Each module is supplied with dry contacts for remote signaling of high and low pipeline pressure.

Transducers

The transducer converts pressure to an electrical signal and supplies the electrical signal to the alarm Gas and/or Remote signal transducer modules. **After the required NFPA initial pressure test of 150 psi or greater has been completed and the pressure depleted,** the pressure/vacuum transducers may be connected to the medical gas pipeline. The transducers may be remotely attached to the piping system at distances up to 5,000 feet using standard 18 gauge stranded twisted pair wire. Tri-Tech Medical recommends mounting the transducers in the zone appropriate zone valve box (utilizing the Tri-Tech Medical E Z Backfeed™ and E Z Find™ features) or in the alarm back box. Should a transducer require service or replacement it is considerably more of a safety issue and more time consuming to locate and replace transducers which have been remotely located above the ceiling and eliminates contamination issues – such as having to set up a tent in order to remove ceiling tiles.

Risers

DISS x ½ O.D. tube gas specific risers with our Frontall™ front loaded check valve are provided for each gas service corresponding to the gas boards ordered in an area or combination alarm. The risers may be installed in the alarm back box or remotely on the pipeline.



Alarm Installation

Installation of the Tri-Tech Medical alarm involves installing the rough-in box, the risers & the transducers (if it is an area alarm or combination alarm) and front panel and making the necessary conduit, plumbing and electrical connections. All installation and testing should be done in accordance with NFPA 99 or CSA Z7396.1.

WARNING: Electrical power intended for the alarm to be installed should be disconnected prior to installation.

WARNING: This device should only be installed by qualified personnel. Installation should not be attempted by anyone not having general experience with the installation of devices of this nature.

Rough-In Box Installation

This is a rough-in box for a combination alarm. Your rough-in box should look the same or similar to this unit. The risers are shipped loose, for protection during shipment, and must be installed. If transducers are to be mounted remotely, it is recommended that they be connected to the DISS demand check valves installed in the corresponding zone valve box equipped with the Tri-Tech E Z Backfeed™ and E Z Find™ features.

Refer to the building plans to determine the location of the alarm.

The contractor is to provide rigid mounting that will support the alarm box on both sides. The metal flanges provided on both sides of the rough-in box are to rest against the rigid mounting brackets. Screws (contractor provided) are to be driven thru the holes in the metal flanges into the mounting brackets. Flanges are adjustable to allow for a drywall depth of 1/2” to 1 1/8”.

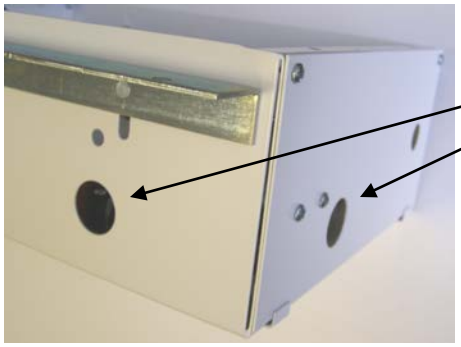
Mount alarm rough-in box so it will be flush or just below the finished wall surface using the adjustment feature on the flanges.

(Side/end view of rough-in back box)

The power supply hole is located in the bottom (left side) of the rough-in box. Remove the plaster cover and panel covering the power supply. Make conduit connections for wiring from the facility **emergency power source**.

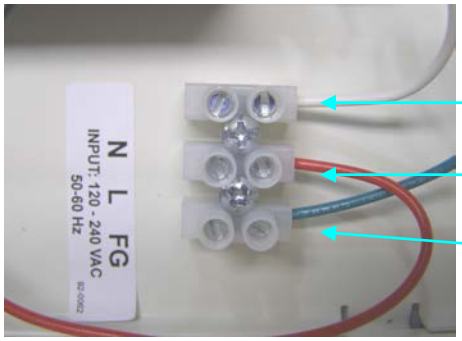
To remove the power supply cover, loosen the two screws at the top of the cover and slide the cover to the right, then lift the cover over the screw heads. Slide the wiring harness strain relief to the left until it is free from the cover.

Wiring

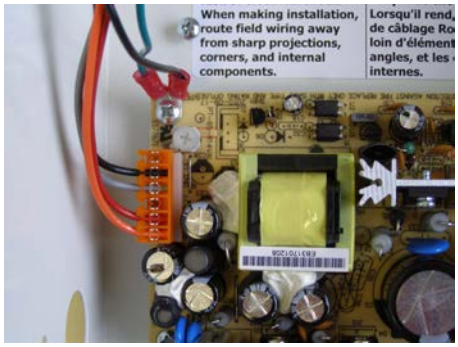


Use either of the two ½" conduit knock-outs provided on the lower left side and bottom of the rough-in box to route conduit to supply either 120 or 240 VAC to the power supply. **Note: Separate conduit should be used for low voltage wires (use knock outs provided on the top of the box)**. Low voltage signal wiring must be run at least 6 inches away from high voltage wiring. (90VAC or greater)

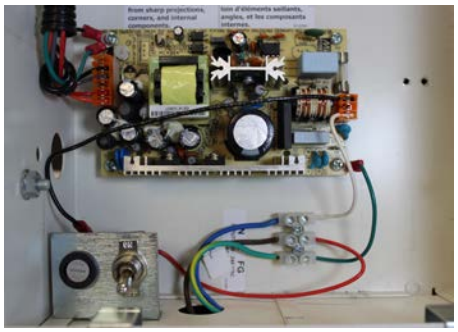
When necessary to cross low and high voltage wiring, maintain minimum 6 inch spacing and cross as close to 90° as possible.



Route wires through the power supply conduit installed in the bottom and left side of the rough-in box. Connect the 120 or 240 VAC facility **emergency power source** electrical wiring to the terminal strip provided on the lower left side of the box. (N = neutral, L = Line (hot), FG = field ground)



The wiring harness will be provided pre-wired to the power supply. If by chance you are replacing a wiring harness, the single green ground wire should be fastened to the screw on the top left corner of the power supply board. The wiring plug in connector (which should contain the rest of the wires), plugs into the connector terminal on the upper left corner of the power supply board. The black wire will be on the top.



This is how the power supply should look when the wiring is completed.

Replace the power supply cover and plaster cover (to protect the unit while the drywall and wall covering work are being done) after wiring is complete

Plumbing the Riser Extension Tubes

Install the risers in the top of the back box as shown.
After removing the protective plastic caps, connect the riser extension tubes to the gas piping system per NFPA 99. Make sure the drop is for the proper gas service. Using a purge gas to insure cleanliness in the tubes, silver braze the joints. **Do not use soft solder.** Conduct heat away from the check valves. (Per NFPA 99 Chapt 5 a nitrogen purge is required). The 150 psi or greater initial pressure test of the piping system must be successfully completed and all pressure removed from the system before connecting the transducers to the system. **Attaching transducers without depleting the 150 psi or greater initial pressure first will result in damage to the transducers!**

Note: It is recommended that gas piping system tubing be connected from the riser extension tube to the ceiling for a future or blank gas display even though a transducer is not being installed. Cap the unused tube above the ceiling. This will simplify future expansion. AU89xx series riser extension tubes are sold separately.

Note: It is also possible to install the transducers remotely (not in the alarm box). In this type of installation the risers are connected to the gas piping system up to 5,000 feet away from the alarm panel.

Note: Tri-Tech Medical recommends mounting the transducers either in the zone valve box (remote) in conjunction with the E Z Backfeed™ and E Z Find™ products or in the alarm back box – **not** remotely above the ceiling. Should a transducer require service, testing or replacement it is considerably more time consuming to locate and replace or service transducers remotely located above the ceiling.

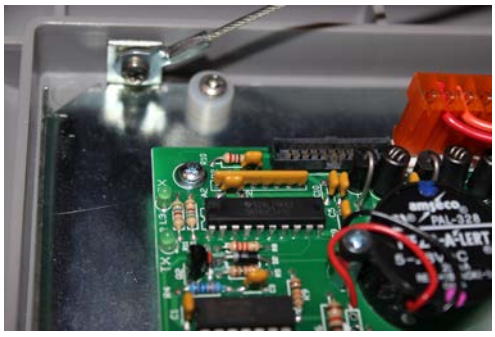
Installing the Hinges

After the walls are finished, the hinges may be installed onto the rough-in box. The two hinges should be fastened to the lower front edge of the rough-in box using the screws provided. The hinge should rest flat against the surface of the drywall.

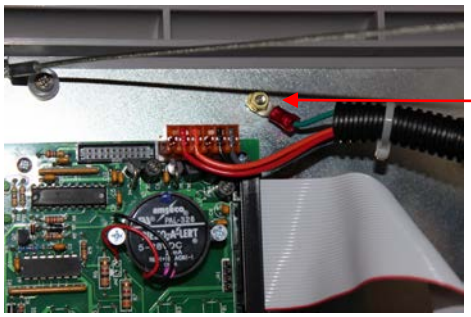
Installing the Alarm Front Panel

The alarm front panel snaps onto the two hinge pins. If the hinge gets detached from the front panel, simply snap it back on.

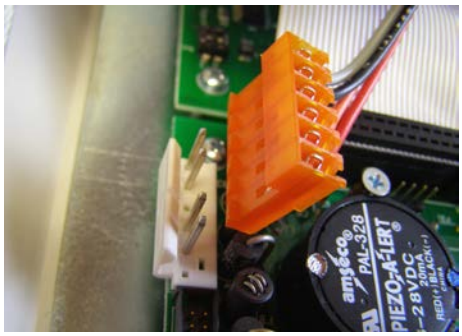
Attach the two (left & right side) lanyard cables to the alarm back box and (if necessary) front panel using the screws provided.



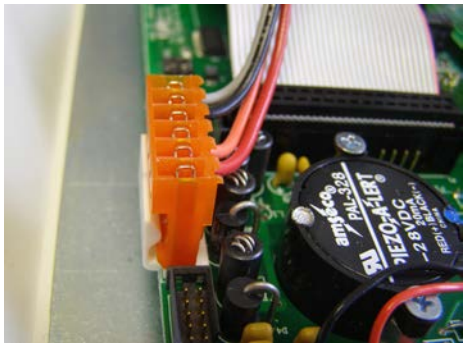
Wiring the Alarm Front Panel to the Power Supply



Attach the green ground wire, which is in the wiring harness, to the ground stud on the left side of the front panel – near the left rear corner of the button board.



Attach the plug connector at the end of the wiring harness to the appropriate connector located at the top left corner of the button module circuit board. The plug should lock into place. The plug can only be inserted one way.



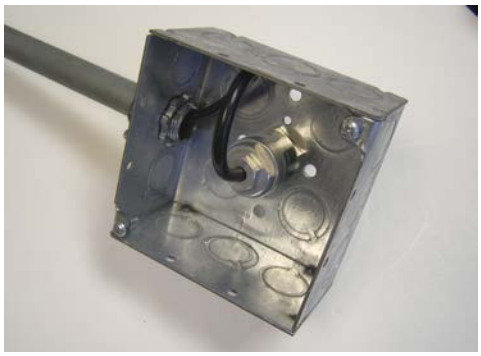
This is how the wiring harness plug connector should look when properly installed on the back of the button module board.

Installing the Transducers (non remote)

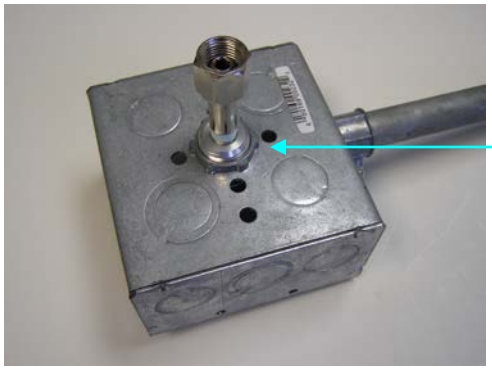
After depressurizing the 150 psig or greater initial pressure from the piping system, install the appropriate transducers to the appropriate riser extension tube connectors inside the rough-in box. Hand-tighten, then torque lightly with a wrench.

Installing the Transducers (remote)

Transducer assemblies with DISS gas specific fittings have also been provided and, after the NFPA intial pressure test of 150 psi or greater is completed and prior to the NFPA 24 hour standing pressure test, they must be connected to the DISS demand valves. Note: maximum mounting distance of each remote transducer is 5,000 feet away from the alarm panel to which it will be wired. Follow the wiring instructions in Appendix F.



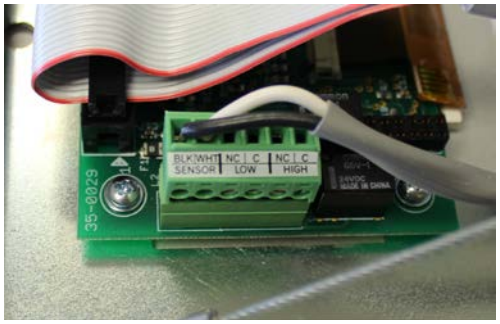
The transducers have been designed so that they may be installed in a standard 4”x 4”x 2 1/8” electrical junction box for added protection.



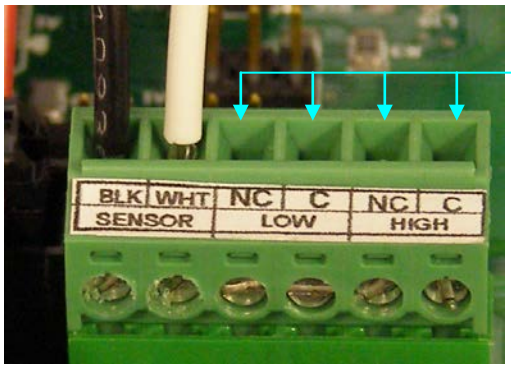
A panel mount feature has been provided to allow mounting of the transducer using standard 1/2”conduit connections and 4”x 4”x 2 1/8” junction boxes. Note: The DISS nut & nipple will need to be removed to allow installation of the conduit nut and then re-installed using oxygen safe Teflon tape.

Care should be taken to not allow debris of any type to enter the transducer during the removal & re-installation of the DISS nut & nipple as this may prevent the transducer from functioning properly.

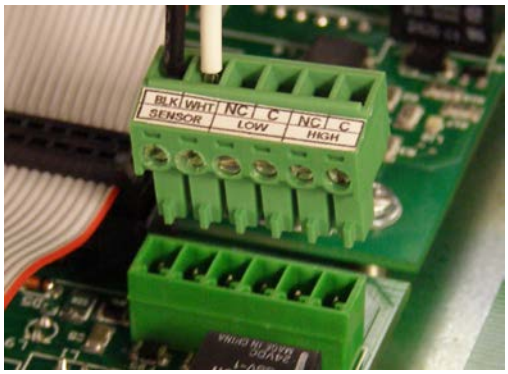
Connecting the Transducer Wiring to the Alarm Front Circuit Board



The wire terminal connector on the gas board has six wire connection slots. The two wires from the transducer should be installed in the BLK & WHT SENSOR slots. These are the two slots closest to the top edge of the gas board (as shown). If the transducer is installed remotely and additional wire is used, it is preferred that the wire polarities remain the same even if the wire colors are changed.

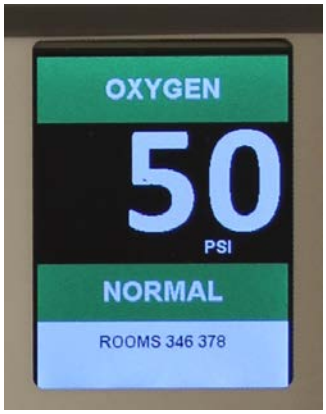


The other four connection slots are for optional remote monitoring of the low and high line pressure alarms on a master alarm, building management system, or other device.



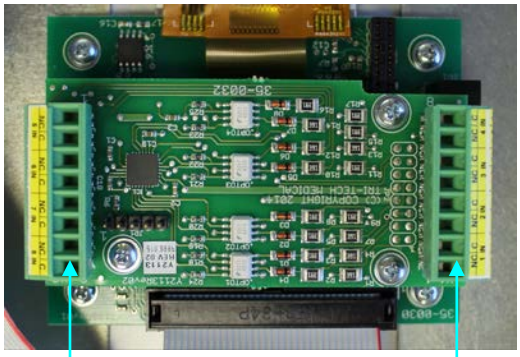
There are a total of 6 connection points – the first two connection points are for the transducer sensor, the next two points are for the low line pressure alarm and the last two points are for the high pressure alarm. The low and high line pressure contact sets provide a normally closed set of contacts and consis of a normally closed (NC) and a common (C) connection.

The transducer plug may be removed from the gas module to make it easier to install the wires.



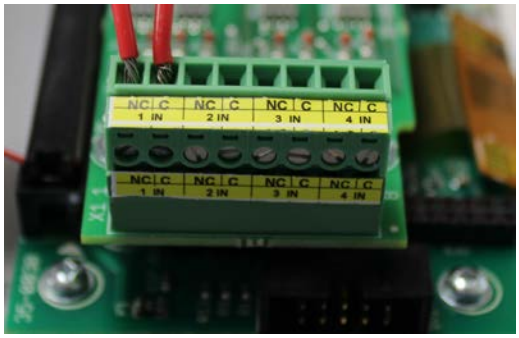
Visually verify that the appropriate transducer wire pair has been attached to the appropriate gas module by looking at the front of the alarm panel. If there is *not* an Error Condition and a System alarm, the proper (matching gas service) transducer has been connected to the gas board.

Wiring the Remote Devices to Remote Signal Master Board (dry contacts)

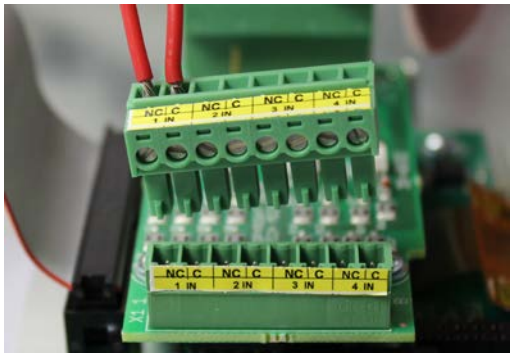


Locate the two banks of 8 terminal connectors on the back of the remote signal (master) board.

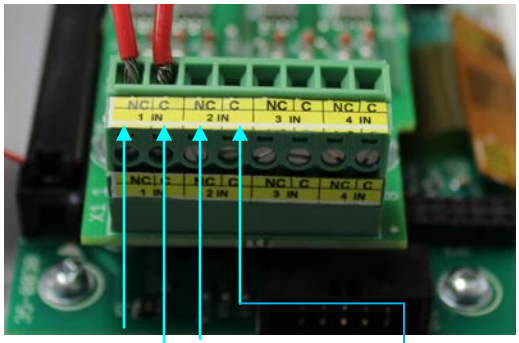
Inputs 1 thru 4 are on the right edge of the board and 5 thru 8 are on the left edge of the board



There are a total of 16 connection points – two connection points for each remote signal. The pairs are labeled 1 IN thru 8 IN on the circuit board. **The NC (normally closed) labeled terminal of each pair is where the signal wire should be landed. The C (common) labeled terminal of each pair is where the common wire should be landed. Note: it is required that polarity be maintained between the switch being monitored and the master alarm.**



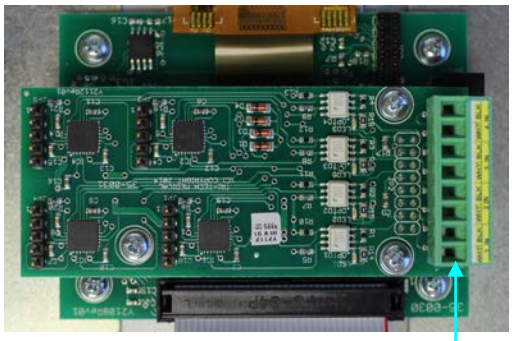
The terminal connector may be un-plugged from the circuit board to simplify installation of the remote signal wires.



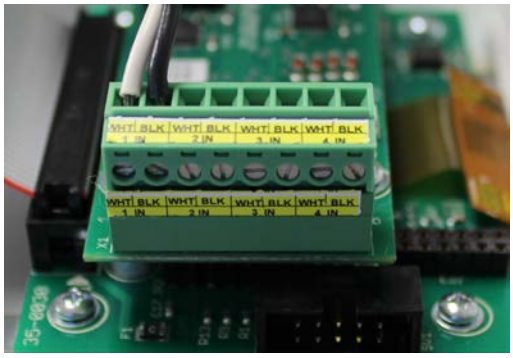
Land the corresponding signal on the NC (normally closed) & common wires on the C (common) terminal of each pair of terminal connectors. It is imperative that the signal wires are landed in the NC position and that the common wires are landed in the C position.

Remote signal #1 Remote signal #2
Common wire signal #1 Common wire signal #2

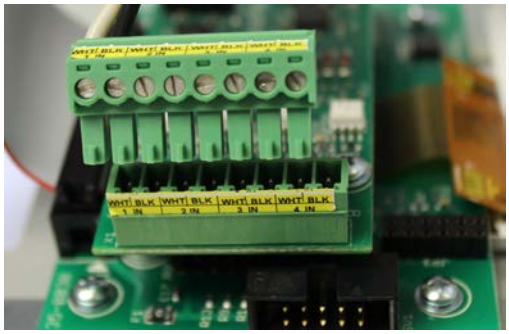
Wiring the Remote Devices to Remote Signal Master Board (transducer sensors)



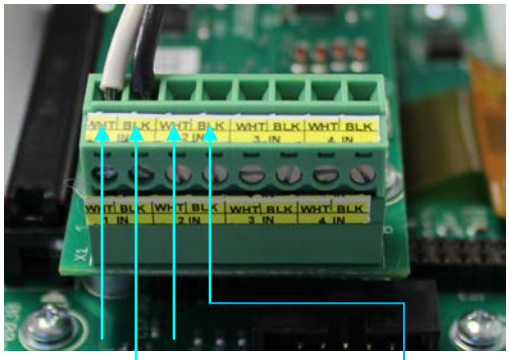
Locate the bank of 8 terminal connectors on the right edge of the back of the remote signal (master) board.



There are a total of 8 connection points – two connection points for each transducer sensor. The pairs are labeled 1 IN thru 4 IN on the circuit board. **The white wire from the transducer should be landed in the WHT position and the black wire from the transducer should be landed in the BLK position. Note: only Tri-Tech Medical D and T series alarm transducers are compatible with the Med Touch alarm system.**



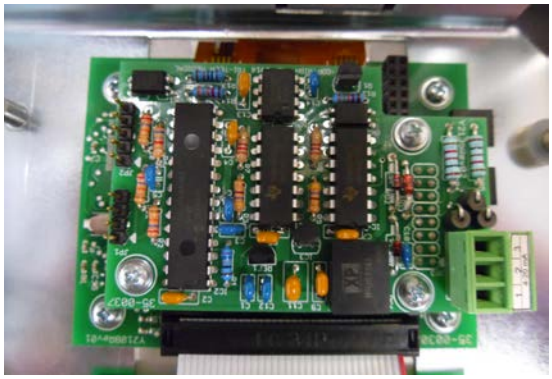
The terminal connector may be un-plugged from the circuit board to simplify installation of the remote signal wires.



The sequence in which the transducers are connected to the board correspond with the order in which they will appear on the display. The #1 transducer will be displayed on top and the #4 transducer will be displayed on the bottom. There will be up to two display positions (high line pressure and low line pressure) for each transducer.

Transducer # 1 white
Transducer #1 black
Transducer #2 white
Transducer #2 black

Wiring the Remote Devices to Remote Signal Master Board (4-20mA transmitters)



Locate 3 port terminal connector on the right edge of the back of the remote signal (Master) board.

The terminal connector will be labeled 4-20mA.

The terminal connector may be un-plugged from the circuit board to simplify installation of the wires.

For 4-20mA transmitters with loop power supplied by an external source.

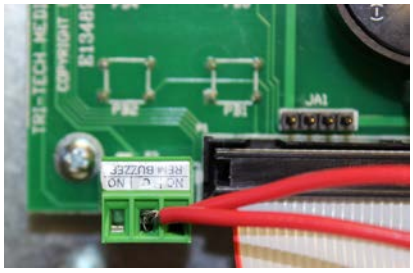
Land the 4-20mA signal wire in the Number 2 terminal port. Land the (-) ground wire to the Number 3 terminal port

For 4-20mA transmitters with loop power supplied by the Alarm Circuit Board (35-0037)

Land the 4-20mA signal wire to the Number 2 terminal port. Land the +12VDC wire to the Number 1 terminal port.

Wiring general fault dry contacts to building automation system or remote alarm

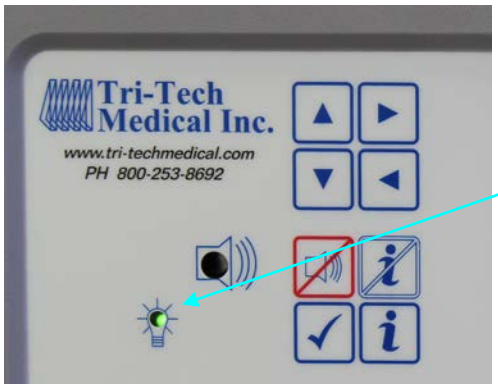
The button board (shown here) is located in the top left corner of the alarm panel. The dry contacts which provide the general fault alarm condition are located on the bottom edge of the board.



Normally Open (NO), Normally Closed (NC) and Common (C) connections are provided.

The terminal connector may be un-plugged from the circuit board to simplify installation of the remote signal wires

You are now ready to supply power to the alarm. Restore power to the circuit feeding this alarm panel. The toggle switch on the front of the power supply should be placed in the ON position.



Check the green power LED indicator on the front of the button module. It should be illuminated.

If you haven't already, you are now ready to pressurize the piping system to normal operating pressures. The alarm is shown here with Medical Vacuum at normal operating pressures. All remote signal points (master alarm signals) are shown in normal condition.

Alarm Displays & Functions

Button Module

Power on Indicator
The power on indicator (green LED) is illuminated whenever electrical power (120 or 240 VAC) is connected to the alarm and the on/off switch is turned on.

Test Button
When the Test button on the front panel is pressed, the alarm illuminates all circuit boards and sounds the buzzer.

Alarm Silence
In the event of an alarm condition an audible alarm sounds. The audible alarm can be silenced by pressing the alarm silence button. The alarm will alternate displaying the rooms/area monitored with the emergency instructions until the alarm condition is rectified. Depressing the silence button will silence the alarm for approximately 10 minutes (factory setting). After approximately 10 minutes, the audible alarm will sound again. (See alarm operation section on page 21 for more detail).

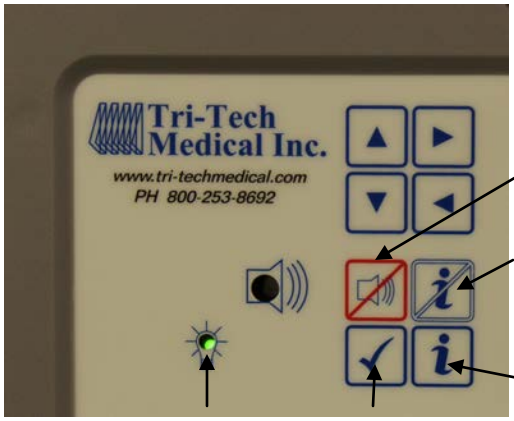
View Last Event Alarm History Button
The Last Event History button may be pressed and held at any time to view last event alarm history. Viewing alarm history is only active while the Last Event History button is pressed, releasing the button returns the alarm to normal operation. Pressing the Last Event History Button will display the following:

Gas (Area) and Remote Signal Transducer Modules - The High and/or Low Pressure indication will be displayed along with the actual highest or lowest pressure which occurred.

Remote Signal (Master) Module – If there was an alarm condition for any Remote Signal the Red LCD will be illuminated. All other LCD's will be off.

4–20 mA Module - The High and/or Low value indication will be displayed along with the actual highest or lowest value which occurred

Clear Last Event Alarm History Button – To clear Last Event Alarm History you simply press the Clear History button.



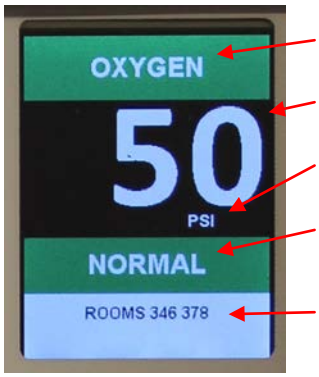
▲ (up arrow)
The up arrow may be pressed & held at any time to display the high line pressure alarm set points of the gas module (area) boards, the remote signal transducer boards and the 4 – 20mA boards.

▼ (down arrow)
The down arrow may be pressed & held at any time to display the low line pressure alarm set points of the gas module (area) boards, the remote signal transducer boards and the 4 – 20mA boards .

► (right arrow)
The right arrow may be pressed & held at any time to display the gas service for which the gas modules (area) boards are currently programmed. (See list on page 26).

◄ (left arrow)
The left arrow may be pressed & held at any time to display the type of transducer that is connected to each gas module (area) board. The 3 types are 0 – 30 In Hg, 0 – 100 psig and 0 – 250 psig. When the left arrow is pressed "30" will be displayed for a 0 – 30 In Hg transducer, "100" will be displayed for a 0 – 100 psig transducer and "250" will be displayed for a 0 – 250 psig transducer.

Gas Module (Area alarms)



Gas Service
(see programming – page 26)

Gas Pressure
The LCD Digital Pressure Display displays the pressure as indicated by the transducer. The gas pressure may be displayed in PSI, kPa, BAR, inHg, or mmHg. PSI and inHg is the factory setting.

Note: Vacuum & EVAC / WAGD may be displayed as inHg or mmHg. Only the applicable unit selection buttons will be active based on the gas service selected. For example - the PSI, kPa and BAR selection buttons will be displayed but are not active when a negative pressure gas has been selected. In kPa mode the Nitrogen gas display indicates one tenth of the actual pressure when the pressure exceeds 999 kPa (i.e. 1100 kPa is displayed as 110 and the kPa and (x 10) appears in the pressure text box.

Note: Alarm settings are maintained even if power is interrupted.

Units of Measure
The Units of Measure is displayed as PSI/inHg, BAR or kPa (whichever is selected during programming – PSI and inHg is factory setting) providing the unit of measure displayed on the LCD pressure reading. In the kPa mode the Nitrogen gas display indicates one tenth of the actual pressure when the pressure exceeds 999 kPa (i.e. 1100 kPa is displayed as 110 and the kPa and (x 10) appears in the pressure text box

High / Normal / Low Condition Status
Should the line pressure of a gas exceed the programmed alarm set points for low or high line pressure, the corresponding low or high line pressure LCD will be illuminated simultaneously with the buzzer sounding to announce an alarm condition has occurred. When the line pressure is neither high nor low it is considered within the normal range and the green Normal LCD is illuminated. These indications are relative to the high and low pressure set points which have been programmed into the alarm. These high and low set points should be set in accordance with NFPA 99 at ± 20% of the normal operating pressure.

Other possible Conditions
Other possible system conditions may occur in the event of a wiring problem, sensor problem or board malfunction. The following codes will be displayed when a System Error or Failure is detected, or when the View Recent History button is pressed:

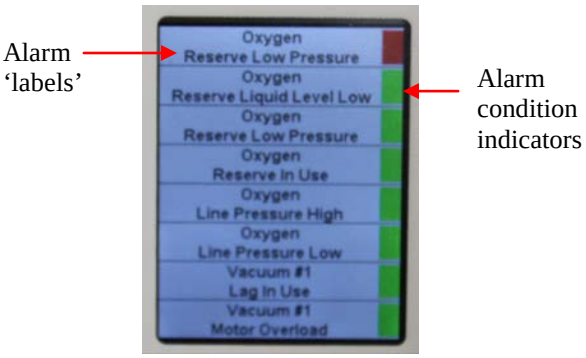
Alarm	Reason
No Sensor	Sensor wire(s) not connected
No Sensor Data	No data sent within allotted time
Bad Sensor Data	Corrupt data, sensor noise
Wrong Gas Type	Miss-matched sensor & gas board
Low Pressure	Pressure is below low alarm set point
High Pressure	Pressure is above high alarm set point

Note: this table covers all alarm modules used in both area & master alarm panels

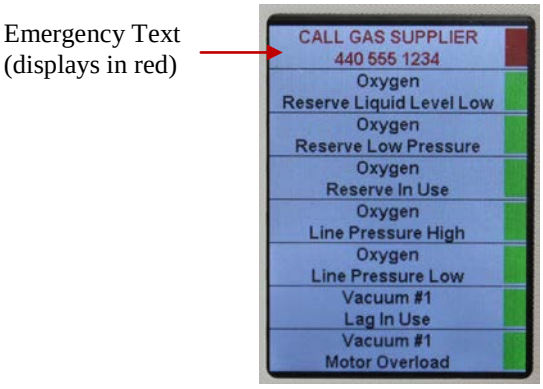
Rooms / area covered & alarm / emergency instructions

When in the Normal Condition, the rooms / area covered information which has been entered by the user is displayed. When in an alarm condition, the emergency instructions which have been entered by the user are displayed alternately with the rooms/area monitored information. In addition the display will flash on and off. Pressing the silence button will silence the alarm and stop the flashing until the repeater time setting has expired. (See Programming Text – page 27).

Master Remote Signal (dry contacts)

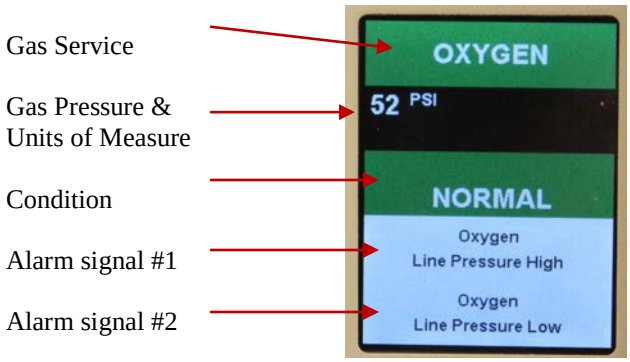


Master (dry contact) modules will provide up to 8 alarm signals when used in communication with dry contact sensors. For each signal point a 'label' must be selected from a pre-loaded database of NFPA 99 master alarm signals. You also have the option of creating your own 'label'. Emergency instructions may also be input (by the user) for each of the signal points. The master boards are pre-programmed with all signal points programmed NC (normally closed). There is an alarm condition indicator for each signal point. The alarm condition indicator will be green when the signal is in a normal state and red when in an alarm state. When an alarm condition occurs in addition to the condition indicator turning red, the display will flash on and off and the emergency instructions will alternate being displayed with the alarm signal label. Pressing the silence button will silence the alarm and stop the flashing until the repeater time setting has expired.



Master Remote Signal (transducer contacts)

Master (transducer contact) modules will provide up to 8 alarm signals when used in conjunction with Tri-Tech Medical transducer sensors. For each signal point a 'label' must be selected from a pre-loaded database of NFPA 99 master alarm signals. You also have the option of creating your own 'label'.

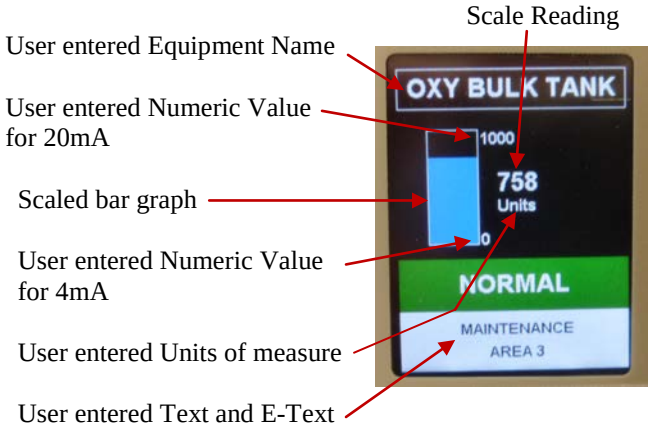


Emergency instructions may also be input (by the user) for each of the signal points. The normal display will appear and react just like a conventional remote signal master dry contact display (shown on the left side of this page), but a touch of the display will change the display (for 30 seconds) to look and react similar to an area alarm gas display (photo above). The advantages of using transducers over pressure switches are;

- Digital display of actual gas pressure
- Greater accuracy / repeatability
- Improved safety (an alarm condition notification is created immediately should a transducer fail)
- Easy / fast push button re-setting of alarm set points
- Lower cost (in most cases)

Master 4 – 20 mA Remote Signal

Monitors the status of a source of the medical gas distribution system (i.e. – liquid level of bulk oxygen) in communication with one 4 – 20 mA signal transmitter and displays a bar graph with user defined units, provides high & low alarms with user defined set-points and provides the emergency instructions (programmed by the user). Other applications may include monitoring flow rates, levels, concentrations, humidity, etc.



Alarm Operation

This section deals with the daily operational aspects of the alarm panel. After installation has been completed and the final user programming of the panel has been properly configured, it is ready for operation.

Silencing the Alarm
Press the **Silence** button when the alarm is sounding and the alarm will be silenced and the module will stop flashing until the repeater time setting has expired.

Area alarm modules are programmed with a **Repeater Delay** feature which monitors only the Gas Module (Area) alarms. The Repeater Delay has been factory programmed to make the alarm re-sound every 10 (ten) minutes as long as the alarm condition exists. Note: the repeater delay may be re-programmed to a different duration or turned-off (see programming page 25). Master remote signal modules may be programmed by the user with the same repeater delay feature (see programming page 25).

Testing the Alarm
Pressing and holding the **Test** button initiates a self-test of the alarm. All LCD's will illuminate for as long as the Test button is depressed. In addition the buzzer will sound. If any LCD is faulty the circuit board should be replaced. If the buzzer does not sound, it is faulty and the circuit board should be replaced.

Note: The alarms (both Area & Master) have a filter programmed to ignore transient signals that are less than 0.7 seconds in duration.

Area Alarm Gas Modules
Monitor the status of the medical gas 'areas' of the facility. Gas modules communicate with transducers and provide: 1) the pressure readings of the gas on each gas display 2) the Normal LCD (green) or Alarm Conditions LCD (red) on each gas display and 3) the emergency instructions (programmed by the user).

If the pressure of one of the gases drops below the programmed low limit setting, the following events take place simultaneously: 1) the Normal LCD will be extinguished 2) the Pressure Low LCD (red) will illuminate 3) an audible alarm will sound 4) the emergency instructions will be displayed alternately with the pressure low (red) alarm display if they have been programmed by the user.

If the pressure of one of the gases rises above the programmed high limit setting, the following events take place simultaneously: 1) the Normal LCD will be extinguished 2) the Pressure High LCD (red) will illuminate 3) an audible alarm will sound 4) the emergency instructions will be displayed alternately with the pressure high (red) alarm display if they have been programmed by the user.

Master Remote Signal (dry contacts)
Monitor the status of the sources of the medical gas distribution system in communication with the remote equipment dry contacts connected to it and provide the emergency instructions (programmed by the user).

The remote signals (master) module displays (via green or red indicators) the normal/abnormal status of the remote equipment connected to the alarm. All alarm panels are pre-programmed upon leaving the factory to monitor normally closed signals (per NFPA 99). In normal operation all active signals will be green. Whenever an abnormal status signal is detected the corresponding green LCD will be extinguished and the red LCD will illuminate. Simultaneously an audible alarm will sound. Pressing the Silence button silences the audible alarm (the Red LCD continues to be lit). Emergency instructions will be displayed alternately with the signal point text if they have been programmed by the user. The appropriate personnel should be notified immediately of the alarm condition. When the alarm condition has been rectified the Red LCD is automatically extinguished and the Green LCD illuminates. **Note:** ***master alarm signals shipped programmed to not repeat – but may be re-programmed (see page 25) to repeat incorporating the Repeater Delay feature.***

Master Remote Signal (transducer inputs)
Monitor the status of the sources of the medical gas distribution system in communication with the transducers connected to it (up to 4) and provide the emergency instructions (programmed by the user).

The standard display will appear and react just like the conventional remote signal master dry contact displays that the industry is used to (reference page 20), but a touch of the display will change the display (for 30 seconds) to look and react just like the conventional area alarm gas display that the industry is used to (reference page 20). The advantages of using transducers over pressure switches are;

- Digital display of actual gas pressure
- Greater accuracy / repeatability
- Improved safety (an alarm condition notification is created immediately should a transducer fail)
- Easy / fast push button re-setting of alarm set points
- Lower cost (in most cases)

Master 4 – 20 mA Remote Signal
Monitors the status of a source of the medical gas distribution system (i.e. – liquid level of bulk oxygen) in communication with one 4 – 20 mA signal transmitter and displays a bar graph with user defined units, provides high & low alarms with user defined set-points and provides the emergency instructions (programmed by the user). Other applications may include monitoring flow rates, levels, concentrations, humidity, etc.

Ethernet Module
This optional module may be added to any alarm panel. It will provide the following features:

- Webserver – allows a remote user access to the alarm's web page – viewing a graphic image of the alarm with all signal conditions, pressure and event / history log information
- Text notification of alarm conditions (up to 5 addresses)
- Event / history log – maintains a rolling list of the 100 most recent alarm condition events and a file of the 1,000 most recent alarm conditions
- Modbus interface

BACnet Gateway module
This optional module may be added to any alarm panel. It will provide a built-in Ethernet connection for transmission of master alarm remote signals to a building automation system. See page 40 for set-up and operation instructions.

Programming the Alarm

This section covers the procedures to follow in order to configure a module with site specific information such as; master alarm signals, room / area coverage information, or emergency preparedness instructions. The *Programming The Alarm section* is also used when adding or deleted a module to an alarm panel.

The alarm has been programmed at the factory prior to shipment. Programming of the alarm may be necessary if:

- a) the high or low pressure limits for a gas need to be modified
- b) to identify the rooms or area covered
- c) to provide custom user emergency response instructions with each area gas and with each master signal point
- d) if a gas service is being changed
- e) if a remote signal alarm point needs to be re-configured or de-activated
- f) if a remote signal module is being added in the place of a blank module
- g) if the Com ID number needs to be changed
- h) you wish to change the repeater delay time
- i) you wish to change the units of measure from psig and In Hg to either BAR or kPa
- j) you wish to have master remote signal alarm notifications repeat
- k) you wish to have alarm notifications 'latched' (requiring manual acknowledgement by pressing the Silence button to clear an alarm after the source of the alarm initiation has been rectified

Note: Only authorized personnel should program the alarm! It is important to note that while the panel being programmed is in the program mode, it is **not** monitoring the medical gas system and alarm conditions will **not** trigger an alarm.

Accessing the Alarm Program Mode

To program the alarm, the circuit boards must be placed individually, one at a time in the program mode. To place a circuit board in the programming mode, simply touch the board to be programmed (once for all other panels and twice for a remote signal transducer input board) until you see this security screen:

All alarm panels have been pre-programmed to allow access with the pin # 0711. Type in 0711 and touch Enter. You will have 30 seconds to make selections when programming. After 30 seconds of no key touch, the display will return to its standard view and any information which has not been saved will be lost.

The next screen which will appear is the function options. There are eleven different function options. Simply touch the icon representing the function you wish to program. The following table provides a brief description of each function:

Function	Description
High	Set high alarm set point
Low	Set low alarm set point
Gas	Set gas service
Repeat	Set repeater delay (in minutes)
Cal	Change calibration of pressure reading
Units	Change units of measure
ComID	Change Com ID number
Text	Input room / area and emergency instructions & master alarm signal selection menu
Set	Change labelling and latching
Back	Return to previous screen
Input	Master alarm NC NO Disable options
View	Synopsis view of programming

Programming the High & Low Alarm Pressure set points

After placing the board in the program mode and touching the High function icon, the high line pressure set point and programming keypad is displayed. The currently programmed high pressure alarm set point is displayed in the white box in the top left corner. If the gas module being programmed is a typical 50 psig delivery pressure, the board has been pre-programmed at the factory with the high line pressure set point at 60 psig, so the display should show the number 60. If you wish to change this setting, simply

- type in the new High pressure
- touch Enter,
- on the next screen touch Back
- on the next screen touch Save to adjust the pressure setting.

After placing the board in the program mode and touching the Low function icon, the low line pressure set point and programming keypad is displayed. The currently programmed low pressure alarm set point is displayed in the white box in the top left corner. If the gas module being programmed is a typical 50 psig delivery pressure, the board has been pre-programmed at the factory with the low line pressure set point at 40 psig, so the display should show the number 40. If you wish to change this setting, simply

- type in the new Low pressure
- touch Enter
- on the next screen touch Back
- on the next screen touch Save to adjust the pressure setting.

Note: The alarm is designed with a safety feature so that the high and low set points must be at least 1 (psig / in Hg), 1 (bar) or 1 (kPa) increments apart. The high set point will not be able to be set below the low set point and vice versa.

Re-Programming the Remote Signal (Master) Alarm Points (NO or Disable)

After placing the board in the program mode and touching the Input function icon, the remote signal input screen (shown here) is displayed. The input number displayed on the top line of the white box corresponds to the signal being programmed. You may toggle to the next or previous signal by using the double arrow buttons in the bottom row. The master boards are pre-programmed with all signal points programmed NC (normally closed) in compliance with NFPA 99. You may re-program each individual signal as NO (normally open) or you may Disable each individual signal point by touching the NO or Disable button. You may re-program all of the signal points (up to 8) before

- touching the OK button
- on the next screen touch Back
- on the next screen touch Save.

Programming the Remote Signal (Master) Alarm Points – NFPA alarm menu

After placing the board in the program mode and touching the Text function icon (see left display above), the remote signal input screen (right above) is displayed. The input number displayed on the top of the second white box corresponds to the signal being programmed. You may toggle to the next or previous signal by using the Down or Up buttons. When you are on the label number that you wish to program, use the double arrow buttons in the bottom row to toggle thru the database of NFPA 99 master alarm signals. The sequence of the master alarm signals is per Appendix D. You may program all of the signal points (up to 8) before

- touching the OK button
- on the next screen touch Back
- on the next screen touch Save.

Programming the Repeater Delay

After placing the board in the program mode and touching the Repeat function icon, the remote signal input screen (shown here) is displayed. The current repeater delay programmed is displayed in the white box at the top. In the example shown here, Rp 10 means the repeater delay is programmed for 10 minutes. Entering zero will disable the repeater. Use the keypad to type in the number of minutes you would like (maximum is 240),

- then touch Enter
- on the next screen touch Back
- on the next screen touch Save

Programming the Units of Measure

After placing the board in the program mode and touching the Units function icon, the units input screen (shown here) is displayed. The alarm panel has been pre-programmed with the units desired based on the part number which was ordered. The positive gas service options are; PSI, kPa and BAR. The negative gas service options are; inHg and mmHg. Simply

- touch the button you would like to re-program the units
- then touch Enter
- on the next screen touch Back
- on the next screen touch Save

Adjusting the Digital Pressure Calibration

The digital line pressure may be adjusted slightly (per the chart below) by following the simple procedure below. *This can be done by one person at the alarm panel – no need to open/adjust the transducers!*

Range of adjustment:
VAC or EVAC /WAGD ± 1 inHg
100 psig transducers ± 3 PSI
250 psig transducers ± 5 PSI

After placing the board in the program mode and touching the CAL function icon, the calibration input screen (shown here) is displayed. The alarm panel has been calibrated and programmed and does not ever require recalibration. If you wish to slightly change the calibration (usually to match another alarm panel in immediate area) you may. The number displayed in the white box at the top of the display is the current pressure reading. Simply

- touch the Down or the Up button until you achieve the pressure reading desired
- touch OK
- on the next screen touch Back
- on the next screen touch Save

Programming the Board Com ID

Note: This feature is used when the alarm is used in conjunction with the optional Ethernet module or as a component in a wireless master panel.

Note: When used in conjunction with the Ethernet module, each circuit board must have a sequential Identification Number from 1 to 16 based on its position in the alarm panel. 1 thru 4 would be from the top of the second slot to the bottom of the second slot. 5 – 8 would be from the top of the third slot to the bottom of the third slot, etc.

Note: When used as a component in a wireless master. Each 8 remote signal dry contact circuit board must have a UNIQUE sequential Identification Number from 1 to 8 based on its position in the alarm panel. For additional information see the Tri-Tech Medical Wireless Master Alarm literature.

After placing the board in the program mode and touching the COMID function icon, the remote signal input screen (shown here) is displayed. The current Com ID # programmed is displayed in the white box at the top. Entering zero will disable the Com ID for this board. Use the keypad to;

- type in the Com ID number you would like
- then touch Enter
- on the next screen touch Back
- on the next screen touch Save.

Programming the Gas Service (area alarm)

After placing the board in the program mode and touching the GAS function icon, the gas input screen (shown here) is displayed. The alarm panel has been pre-programmed with the gas service desired based on the part number which was ordered. To select a different gas service use the double arrow left or right buttons to scroll thru the database of gas services until you find the one you need

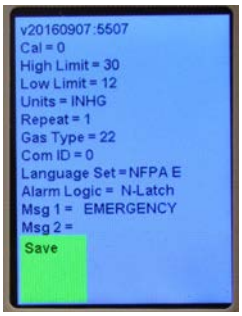
- then touch Enter
- on the next screen touch Back
- on the next screen touch Save

Programming color code standard, language and latching or non-latching alarm relays

After placing the board in the program mode and touching the Set function icon, the sets input screen (shown here) is displayed. The alarm panel has been pre-programmed with the language desired based on the part number which was ordered. Choose a different language set by simply touching the button you would like (see chart below). Your selection will take you immediately to the next screen on which you should touch Back and on the next screen touch Save. You will need to re-enter the program mode and again select the Set function icon to choose Latching (LATCH) or Non-Latching (NLATCH) software. Your selection will take you immediately to the next screen on which you should touch Back and on the next screen touch Save.

Gas Set Button	Description Standard / Language
NFPA E	NFPA color code - English
ISO E/F	ISO color code – English / French
NFPA E/S	NFPA color code – English / Spanish
ISO E/S	ISO color code – English / Spanish
ISO2 E/S	ISO color code for Chile only* - English / Spanish
	*Oxygen color code is white background with black text

View screen



After placing the board in the program mode and touching the VIEW function icon, the view screen (shown here) is displayed. The view screen provides a summary view of all of the programming for the circuit board. It does not provide any programming options. It is simply a view only screen. The first line provides the software version. The Cal value represents any re-programmed change from the factory calibration. The High and Low Limit values are the high and low pressure alarm set points. The Units value is the units of measure. The Repeat value is the number of minutes in which an alarm will be repeated after it has been silenced but remaining in an alarm condition. The Gas Type number is a code (see table below) which corresponds to the gas service which has been programmed for the board. The Com ID number is the communication ID number which has been programmed for the board. The Language Set is an abbreviation for the label set which has been programmed for the board. The Alarm Logic is the latching or non-latching software which has been programmed for the board. MSG 1 are the rooms or area(s) covered by the alarm. MSG 2 are the emergency instructions programmed for the board.

The gas boards are pre-programmed for a specific gas service from the factory. After placing a gas board in the program mode, it is possible to change the gas service of the board. It is an NFPA 99 requirement that the transducer gas service match the gas service of the gas board to which it is connected. The following list cross references the number that is actually displayed on the gas board numeric display with the full names of the gases:

Gas type displayed	Gas service	Transducer type
12	Nitrogen	250
24	Oxygen	100
04	Nitrous oxide	100
08	CO2 or CO2-O2 mix	100
22	Medical Vacuum	30
32	Wagd / AGSS	30
16	Medical air	100
06	Helium or Heliox	100
H16	Instrument air	250
H24	Hyperbaric oxygen	100
H08	Medium pressure CO2	100
SP	Gas mixture	100
HSP	High Pressure gas mix	250
3SP	Tri-Gas	100

Programming Text and E Text (gas / area alarm & transducer master boards)

After placing the board in the program mode and touching the Text function icon, the text input screen (shown here) is displayed. To enter text such as the room(s) or area(s) monitored by the alarm panel, touch the Text button. To enter emergency instruction text, touch the EText button. The two white areas represent a top and bottom line of text which will be displayed at the bottom of the gas board or transducer master board display. Touch the top white area to enter the top line of text or the bottom white area to enter the bottom line of text. Use the character keypad (shown here) to enter the text message you would like displayed. The double back key << can be used to erase characters while entering text. Note: each text display line is limited to 20 total characters or spaces. When finished touch Enter, on the next screen touch OK, on the next screen touch Back and on the next screen touch Save.

Below are examples of a completed Text display screen and how it appears as displayed as part of the gas or transducer master display. When an alarm occurs the emergency instructions will appear alternately with the normal information label Note: the text will automatically be centered.

E Text instructions are entered in the same method as described above. Note that E Text instructions will appear in red and will be displayed alternately with the normal display screen only when the board is in an alarm condition.

Programming E Text (master boards with dry contacts)

After placing the board in the program mode and touching the Text function icon, the Alarm Label / E Text input screen (top photo) is displayed.

To enter emergency instruction text touch the EText button, the screen shown (second photo) will appear. The two white areas represent a top and bottom line of text which will be displayed at the bottom of the master board display. Touch the top white area to enter the top line of text or the bottom white area to enter the bottom line of text.

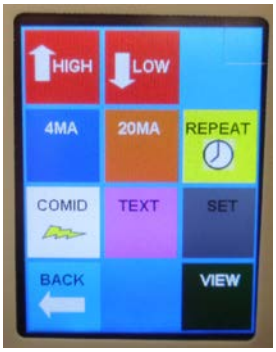
Use the character keypad (third photo) to enter the text or E Text message you would like displayed. The double back key << can be used to erase characters while entering text. Note: each text display line is limited to 20 total characters or spaces. When finished

- touch Enter
- on the next screen touch OK
- on the next screen touch Back
- on the next screen touch Save

Below are examples of a completed Text display screen and how it appears as displayed as part of the master board display. When an alarm occurs the **E Text** emergency instructions will appear alternately with the normal alarm signal label. Note: the text will automatically be centered.

Programming the 4-20mA Master Remote Signal Module

Most of the programming for the 4-20mA board is done the same way as described in the previous pages. After entering the **0711** access code the programming screen will appear as shown below.



There are a few new Icon buttons that are unique for this module. The 4MA icon is used to set the numeric value that a 4mA signal will represent based on the units you will be using i.e. 100 gallons. The 20MA icon is used to set the numeric value that a 20mA signal will represent i.e. 2000 gallons. These values will represent the span of the 4-20mA device.

The HIGH and LOW icons are used to set the respective numeric values that will trigger these alarms based on the units that are selected.

Programming the equipment Name or Units of measure;

After entering the **0711** access code, touch the **TEXT** button. A screen with programming choices will appear as shown below.

Touch the **Name** or **Units** button that you want to program. A character keypad will be displayed as shown below. Type in the information you want to be displayed. **Note:** there is a limit of 12 characters or spaces. The Name will automatically be centered in the box at the top of the display. The Units will be displayed to the right of the bar graph. When finished touch OK, on the next screen touch OK, on the next screen touch BACK, on the next screen touch SAVE.

Programming the **Label** text and **EText** is done the same way an Area Alarm is done as described on pages 27 and 28. Programming the REPEATER, COMID, and the functions under the SET button are the same as described on pages 25 and 26.

Installing the Ethernet/ Rabbit boards

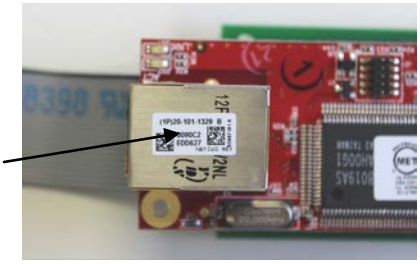
CAUTION: The Ethernet/ Rabbit boards should only be installed after all wall construction and finishing is completed to prevent ingress of dust and debris. This contamination can adversely affect their proper function.

The Ethernet/rabbit board module (photo at right) may be ordered initially as part of the alarm or added later as a simple retro-fit assembly. To install the Ethernet kit, follow the installation instructions included with the kit. Refer to Appendix J for proper Ethernet and Ribbon cable connections.

Always turn the power off to the alarm panel before making any electrical connections or disconnections.

MAC Address Option

MAC Address



It is possible to set up an Ethernet/Rabbit board MAC address on a server, to the computer so the I.P. addresses are dedicated to that application. First you will need to know the MAC address of the Ethernet/Rabbit board as well as the I.P. address for the board.

Here's how the MAC address for the Ethernet/Rabbit interface board can be determined. Find the label on the chrome plated plug in box for the Cat 5 connector that looks like the one in the photo above. (Note: there may be another label that has been placed on top of this label, if so, it needs to be removed carefully). This is the MAC address label. The MAC address is 12 digits. The first 6 digits are always 0090C2. The rest of the digits follow on the second line. For example, in the photo above the complete MAC address is 0090C2EDD627.

Integrating the Ethernet/ Rabbit boards into a network

To integrate the Ethernet/ Rabbit boards into your facilities network and allow communication to the internet, various setting must be checked and/or changed in the networks Router and Server. Refer to the check list below for configuring your network.

Note: networking options only work when used with manufactured supported software systems (currently) Windows 7 or newer.

1. **Configure Router Port**
   The port on the router, that the Ethernet cable from the Rabbit board will be plugged into, must be configured for half duplex. Most routers will auto set for this however if you experience communication difficulties, the router port setting should be checked.

2. **Check the Local Network Settings on your Server**
   The E-mail server in the rabbit board resides on port 587. Your server gateway IP address needs to be assigned to port 587 and the IP address of each rabbit board added as a remote server. See pages 30-32 for an example of how to do this. Note: The IP address of the Rabbit board is defaulted to 192.168.0.99 as shipped. The IP address must be unique for each Rabbit board and may need to be changed to be compatible with your network. The IP address in the Rabbit board can be changed during step 3.

3. **Program the Rabbit Board**
   Program the Rabbit board using Real Term: Serial Capture Program and 35-3033 Programming kit, as described on page 33-36.

4. **Test E-mail Contacts**
   If E-mail contacts were programmed into the Rabbit Board they can be tested using the MCx (Test Command) while in the Real Term Program, as described on page 37.

5. **Website Access**
   If multiple alarm panels are to be viewed as websites from outside the facility, a reverse proxy server needs to be set up in the facility with each alarm panel having a unique name i.e. TRI-TECH.tri-techmedical.com etc. See page 38 for more information.

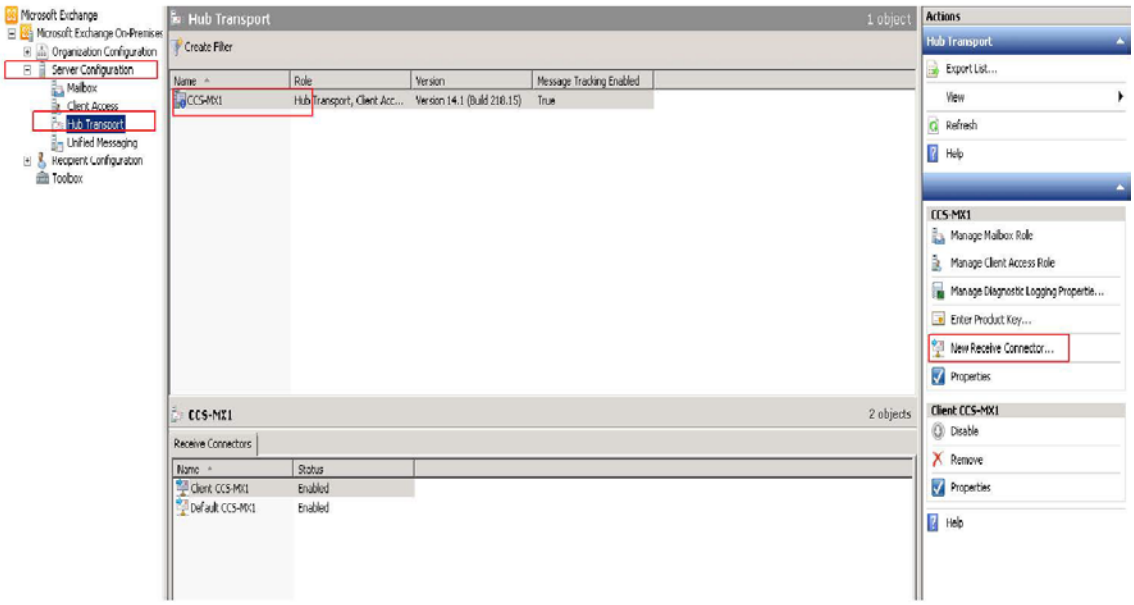
Create Receive Connector – Exchange 2007/2010

"SMTP" (Simple Mail Transfer Protocol) is one of the most common ways of sending e-mail. SMTP is a simple text conversation across a TCP/IP connection. The Email Server resides on port 587, and so, that is what the rabbit board SMTP _ PORT is currently defined.

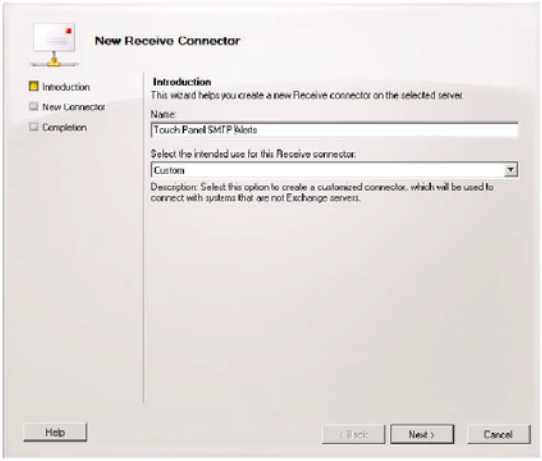
Create Receive Connector - Exchange 2007/2010

Tuesday, May 17, 2016 2:22 PM

1. Open the Exchange Management Console.
2. Expand Server Configuration.
3. Click on Hub Transport.
4. Select the server name on the right hand side.
5. In the Toolbox Actions. Click on **New Receive Connector**.

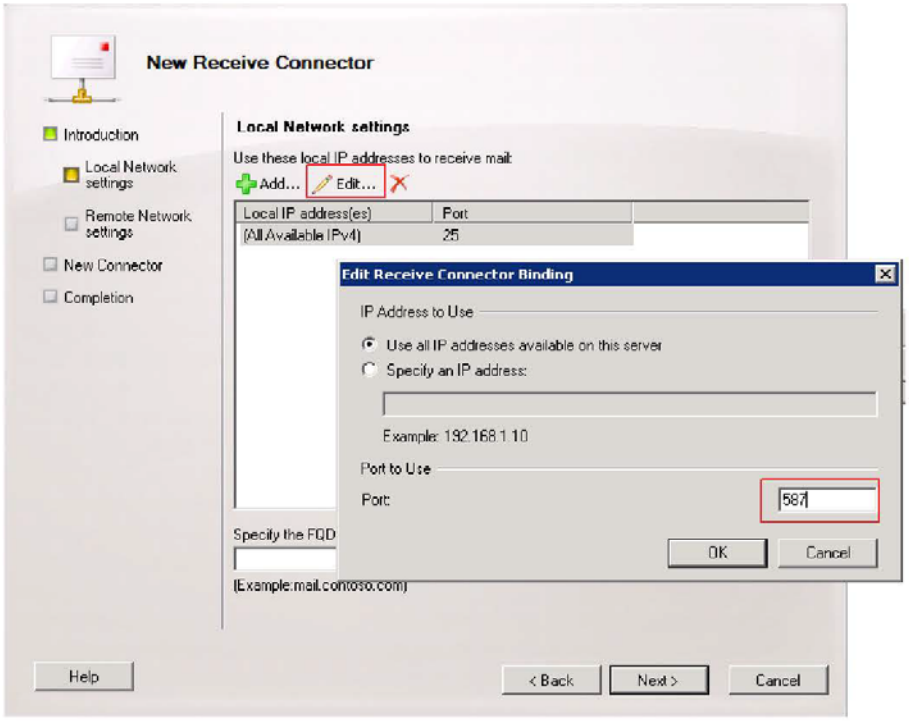


6. In the **New Receive Connector** wizard enter a Name for the connector and leave the Intended use set to Custom then click [Next>].

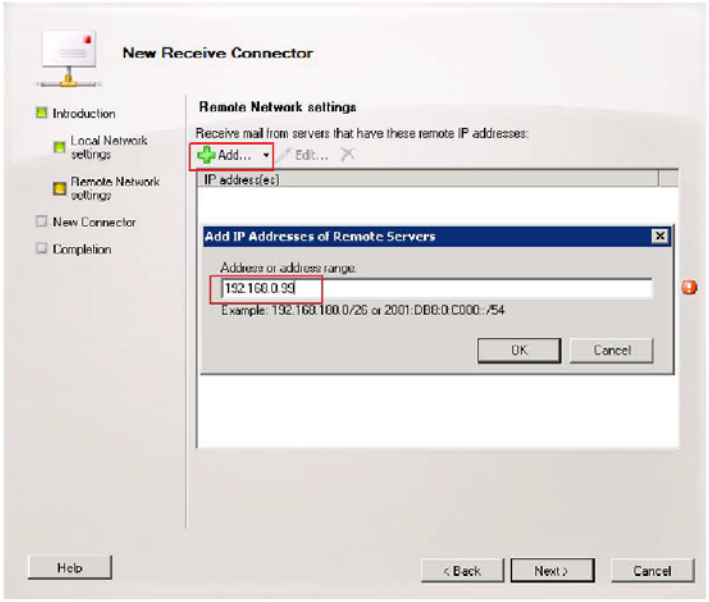


7. In the **Local Network Settings** Click Edit and change the Port to Use from 25 to 587 and click [OK] then Click [Next>].

7. In the **Local Network Settings** Click Edit and change the Port to Use from 25 to 587 and click [OK] then Click [Next>].

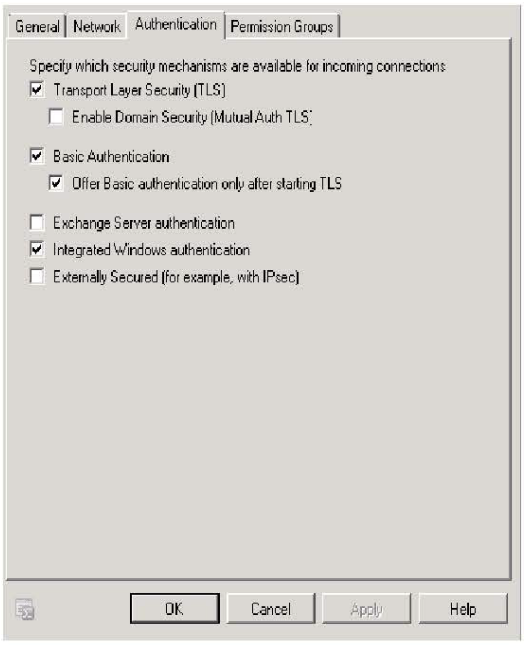


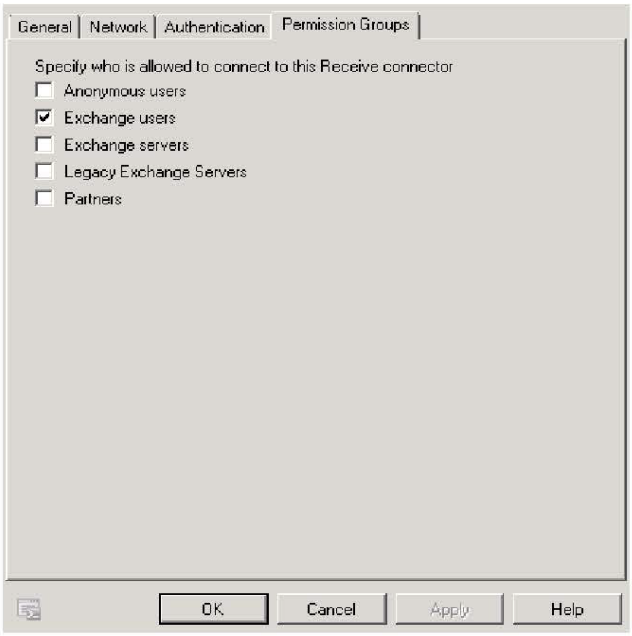
8. In the **Remote Network Settings** click on the red **X** to delete the default IP range of 0.0.0.0-255.255.255.255 then click Add
9. In the **Add IP Address of Remote Servers** enter the IP address of your Rabbit Board and click [OK] then [Next>].



10. on the **New Connector** configuration summary screen click [New].

11. Once the new receive connector is successfully created right click on it in the list of Receive Connectors and select Properties.
12. Configure the Authentication and Permission Groups tabs as illustrated below and click [OK].





Programming the Ethernet/Rabbit boards (e mail/text messages, accessing alarm website, interface Modbus with building automation system & access event log). **NOTES: Networking options only work when used with manufacturer supported software systems (currently Windows 7 or newer). System router ports must be configured for 'half duplex'.**

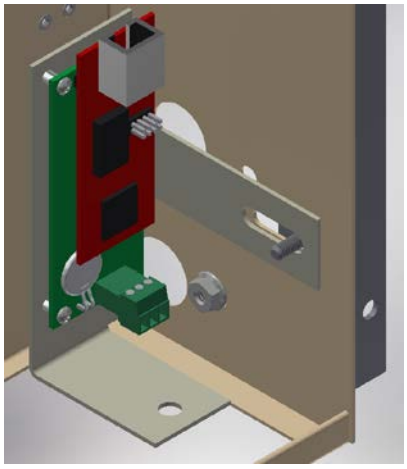
To program the rabbit board, you will need to download Real Term: Serial Capture Program. This is a free software download available on the internet.

Go to **https://sourceforge.net /projects/realterm/** You will want to install the Real Term software on a laptop so that you have the mobility to bring the laptop close to the alarm panel. You will also need a 35-3033 rabbit board programming kit.

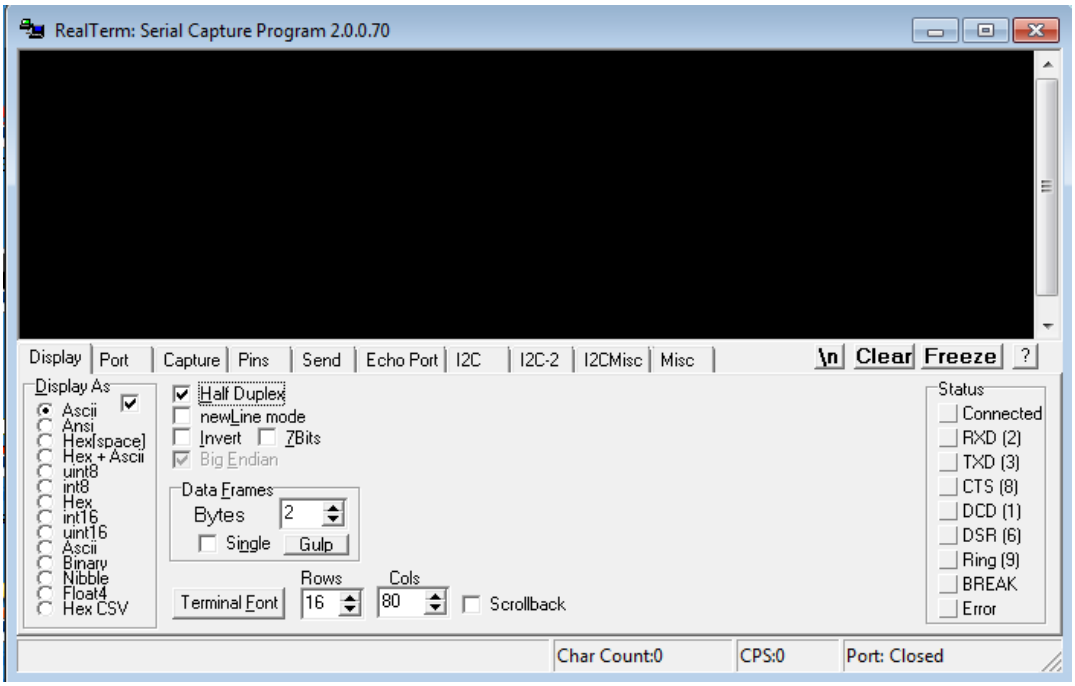
Note: If your operating system doesn't pull in the driver for the 35-5069 cable, you must download the driver from the website.
http://www.ftdchip.com/Drivers/VCP.htm

Once you open the website scroll down to Currently Supported VCP Drivers – the first box is **Windows* - Comments – click on set-up executable** – than click on **CDM21218_Setup.exe** to install the drivers.

Always turn the power off to the alarm panel before making any electrical connections or disconnections. **Warning: Uncoupling the rabbit board from the Ethernet board (red and green boards in photo below) will result in loss of all of the programming.** After the Ethernet kit is installed in the alarm panel and the **Real Term: Serial Capture Program** software is installed on a laptop and the 35-3033 rabbit board programming kit is connected properly, you are ready to begin.

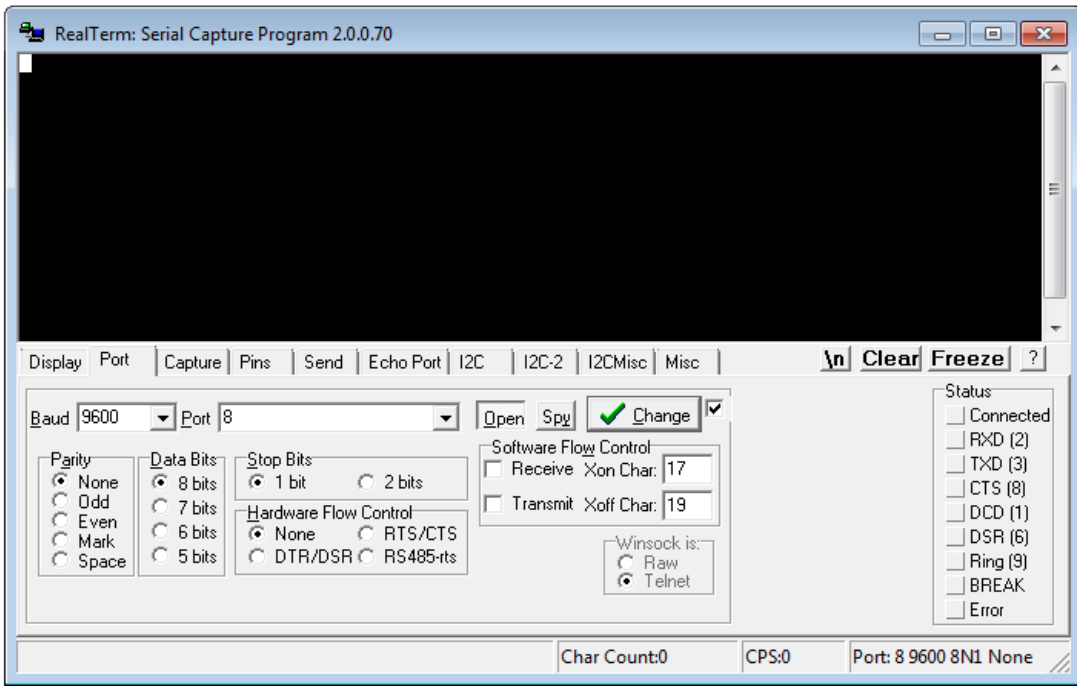


Launch the **Real Term: Serial Capture Program**. The set-up screen should look like this. Under the Display Tab check the Half Duplex Box.

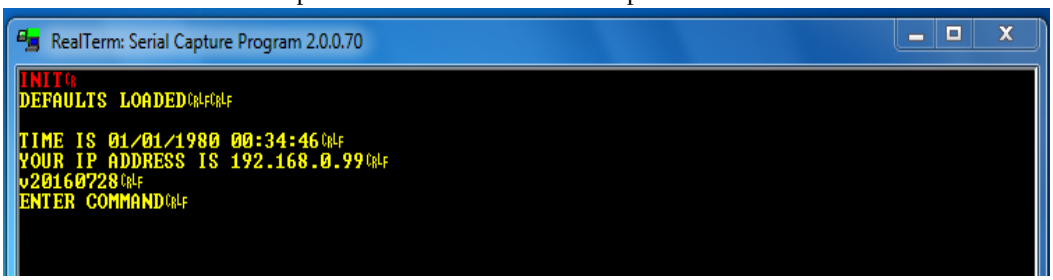


Under the Port Tab;

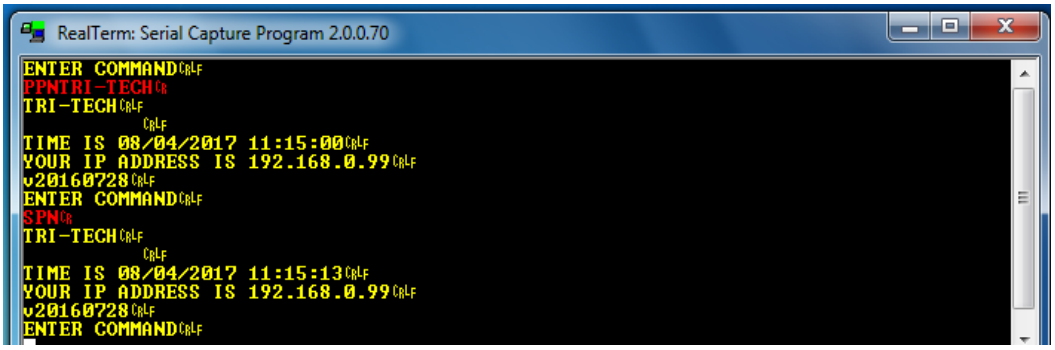
1. Select a baud rate of 9600
2. Leave the defaults of Parity= None, Data Bits = 8, and Stop Bits = 1
3. Select the port in use on the laptop
4. Click the Open button



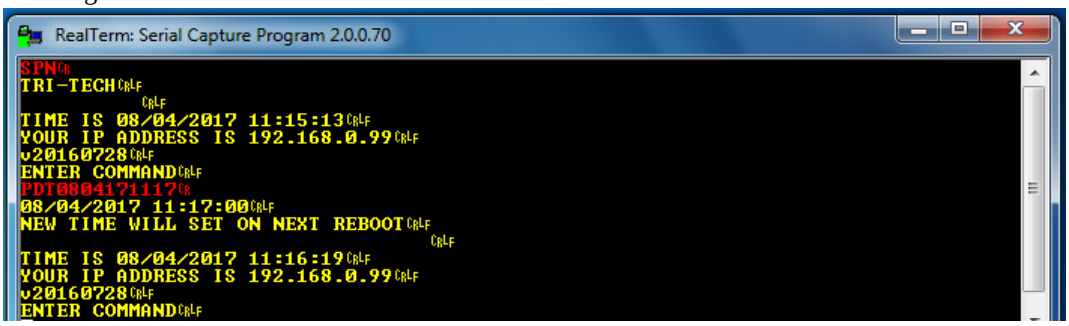
To set up a new Ethernet/Rabbit board, the following 4 commands must be completed:
INIT (Initialize) – this command MUST be run first after installing a new rabbit board or after if a battery was replaced on the rabbit board when the alarm panel was not under 120 VAC power.



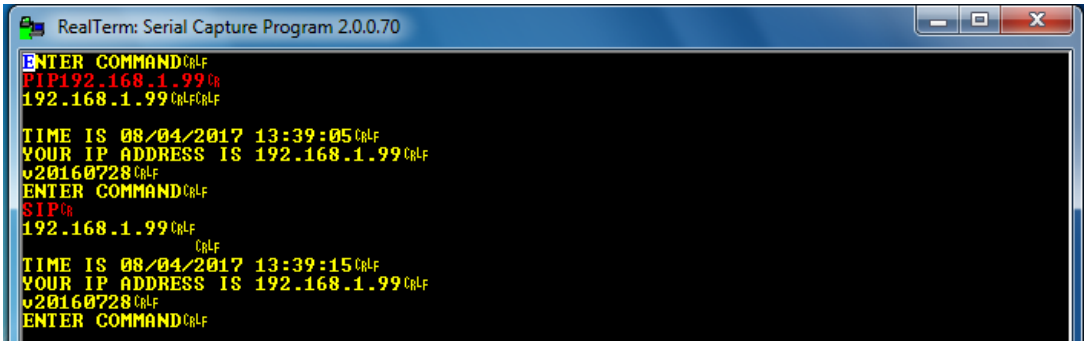
PPN (program panel name) – this command programs the name of the alarm panel as it will be displayed on the website and recorded in the event log. In the example below, we have named the alarm panel Tri-Tech.



PDT (program date/time) – this command programs the date and time as it will be displayed on the website and recorded in the event log. The alarm should be turned OFF then back ON after programming the Date and Time to save the setting.

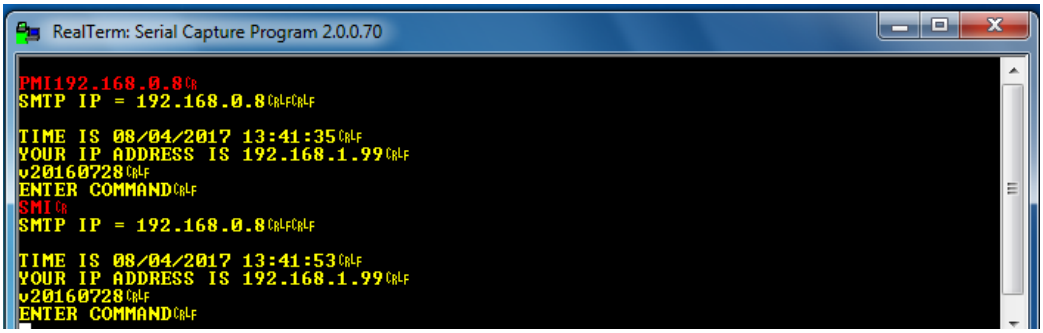


PIP (program panel IP) – this command programs the rabbit board's IP address

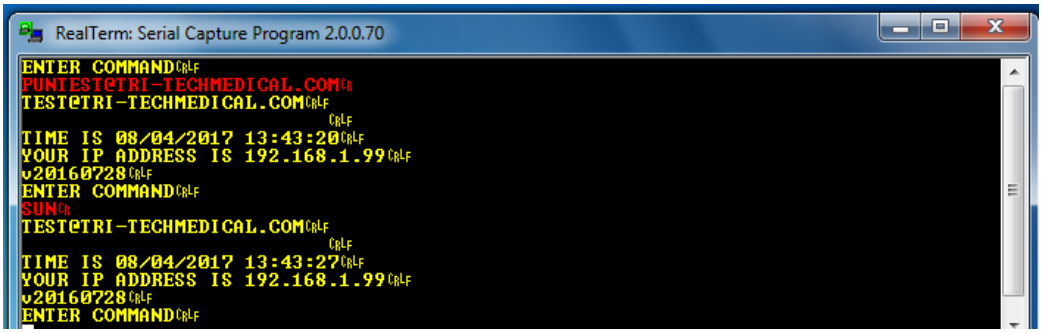


To set up users to receive e-mail or text notifications when alarm conditions occur, the following 4 commands must be completed:

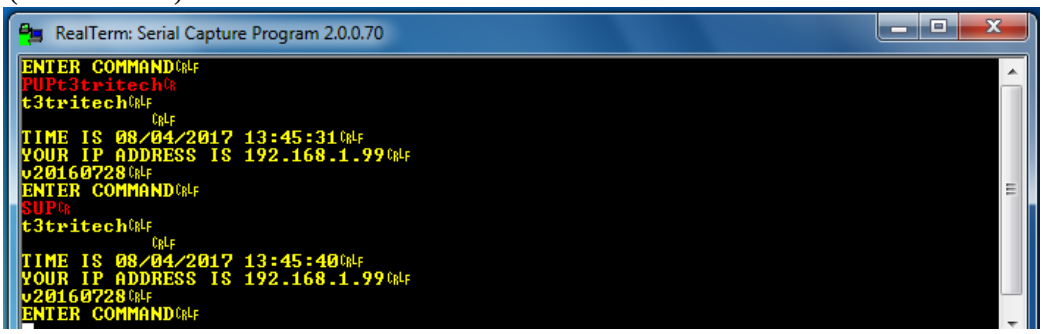
PMI (program SMTP mail server IP) – this command establishes the mail server IP address.



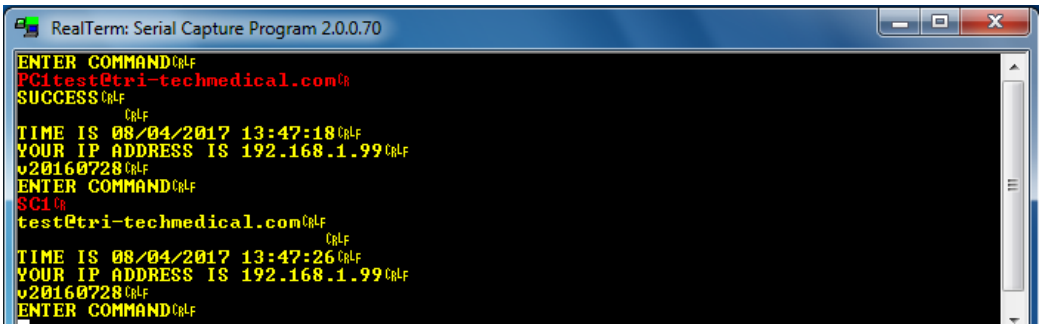
PUN (program user name) – this command establishes the SMTP user name. In the example below, we have used TEST@TRI-TECHMEDICAL.COM.



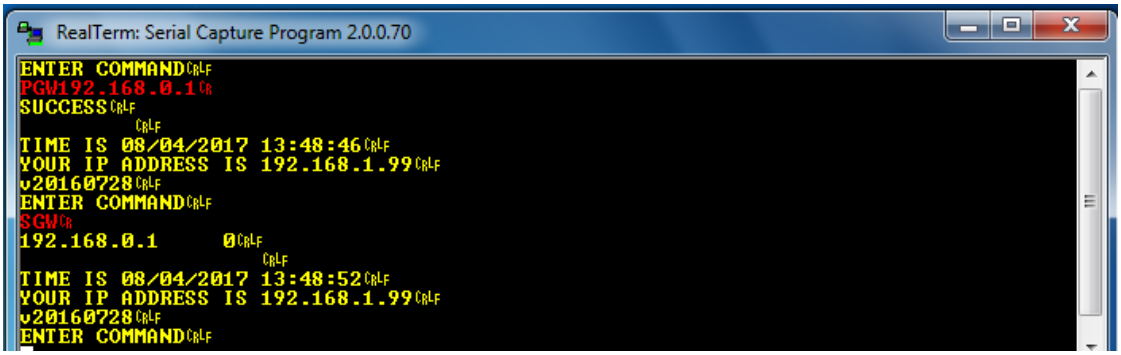
PUP (program user password) – this command programs the SMTP password. In the example below, we have used t3tritech. (Case Sensitive)



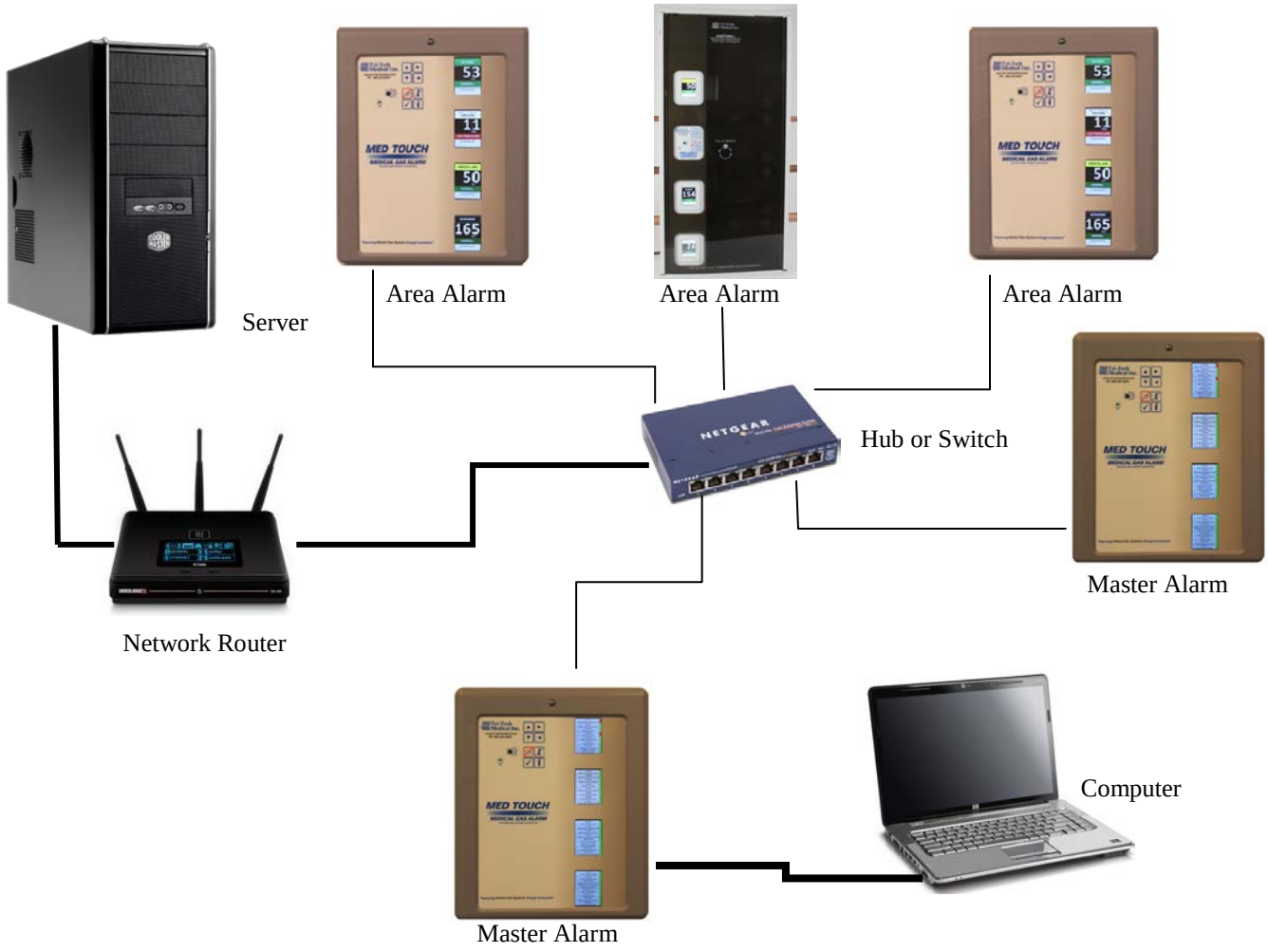
PCx (program contact) – this command is used to program a contact to be notified where x is the contact number. The contact number(s) will be displayed on the event log. Up to five contacts may be programmed. See Appendix M for Text Message carriers access information.



To set up communication through the facilities network server with the internet, the Program Gateway must be used.
PGW (program gateway) – this command establishes communication from the alarm rabbit board through the facilities network server to the internet.



Below is an illustration of a simplified typical managed network at a facility. Both the rabbit boards IP address and network gateway IP address must be programmed into the rabbit board of any alarm panel desired to be connected to the internet.



The following additional commands are available for reviewing and testing:

SCx (show contact) – this command is used to verify the contact entry. For example - **SC2** would display the contact entry for user #2.

MCx (test command) – this command is used to verify that a contact and e mail server is set up correctly. It sends a test e mail to that contact.

Following is a complete list of the available commands:

All commands are issued from the command prompt over the serial port. Set the PC's serial port to 9600 8N1. Boot the rabbit board.

INIT // INIT SETUPS.
!!! IMPORTANT !!! This MUST be run first on a new board or after battery replacement. Usage: INIT

SIP // SHOW IP.
SMB // SHOW MODBUS ID.
SUN // SHOW USER NAME.
SDT // SHOW DATE/TIME.
SGW // SHOW GATEWAY.
SPN // SHOW PANEL NAME.
SMI // SHOW SMTP MAIL SERVER IP.
SUP // SHOW USER PASSWORD.
SAL // SHOW ALARM LOG.
SCx // SHOW CONTACT.
Usage: Enter the command as shown.

SCx // SHOW CONTACT where x is contact number 1-5. Usage: SC1 will show email contact 1 of 5.

PPN // PROGRAM PANEL NAME. Usage: PPNMyPanel will set the Panel Name to MyPanel.

PMB // PROGRAM MODBUS ID. Usage: PMB01 will set the Modbus ID to 1.

PDT // PROGRAM DATE/TIME. Usage: PDT0129160842 will set RTC to Jan 29th, 2016 at 8:42am.
PDT0203162042 will set rtc to Feb 3rd, 2016 at 8:42pm.

PIP // PROGRAM IP. Usage: PIP192.168.0.50 will set the rabbit board IP address to 192.168.0.50

PGW // PROGRAM GATEWAY. Usage: PGW192.168.0.1 will set the gateway IP address to 192.168.0.1

PMI // PROGRAM SMTP MAIL SERVER IP. Usage: PMI192.168.0.50 will set the SMTP mail server to 192.168.0.50
PMI will clear the SMTP mail server.

PUN // PROGRAM USER NAME. Usage:PUNMyUserName will set the SMTP user name to MyUserName
PUN will clear the user name.

PUP // PROGRAM USER PASSWORD. Usage:PUPMyPassword will set the SMTP password to MyPassword,
(Case Sensitive) PUN will clear the password.

PCx // PRGRAM CONTACT where x is contact number 1-5. Usage: PC1Name@mymail.com will set contact 1 to Name@mymail.com PC1 will delete the contact.

MCx // MAIL CONTACT where x is contact number 1-5. Usage: MC1 will send contact 1 a test email.

To setup a new Rabbit board...
1. INIT
2. PPNPanelName
3. PDT0129160842 replace with current date and time.
4. PIPx.x.x.x replace x's with board's IP address.
5. PGWx.x.x.x replace x's with gateway's IP address.

If SMTP mail server is to be used...
6. PMIx.x.x.x replace x's with Server's IP address.
7. PUNMyUserName
8. PUPMyPassword…(Case Sensitive)
9. PCxname@email.com and/or PCx14567890123@vtext.com
…up to 5 contacts total.
10. Use the show and test mail commands as necessary to check setups.

Note: *See Appendix N on page 62 for a useful Programming Log Sheet to record your settings.*

Modbus Interface-

The command list on the previous page includes commands for Modbus ID and Gateway IP programming. The only setup needed to run Modbus is the Modbus ID. The Gateway IP address is used for getting messages out of the local area network. This is typically a router on the LAN.

SMB – Show Modbus ID	SGW – Show Gateway IP
PMB – Program Modbus ID	PGW – Program Gateway IP

An example Modmap is shown on page 44. The Read Scan Lines are generated automatically by the Ethernet / Rabbit board and will match the configuration of the alarm panel. Individual informational items may be selected from the complete Modbus map to be communicated to the building management system or to the BACnet module for use on the building automation system.
See page 43 for an example of the complete Modbus map.

If it is desired to communicate with the building management system using Modbus only (not BACnet) – then only the Ethernet module is required.

Website Access–

Web access to the overview and alarm log pages can be done in several ways.

Viewing the Website of the Alarms Panels from within your facility ONLY:

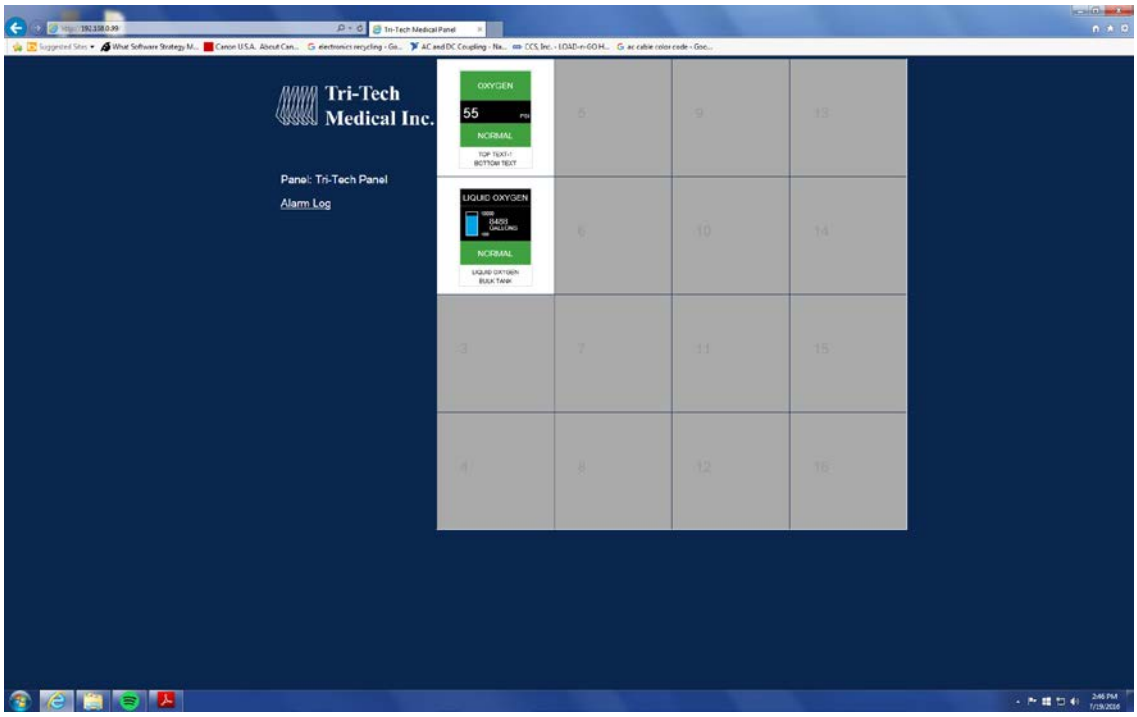
Add the IP address of each rabbit board to your local network as a remote server.

You can then point a web browser at each of the alarms panels to view their webpage using their unique IP addresses. Consult your network administrator if you want to assign a name to each of the panels in your facility instead of using the IP address. It is recommended that the same panel name used when programming the rabbit board be used here to avoid confusion.

Viewing the Website of the Alarm Panels from outside your facility over the Internet:

If there are multiple alarm panels on the network in a facility then a reverse proxy server must be set up with software such as Microsoft TMG (Threat Management Gateway) or other similar software to manage the multiple panel traffic. The website uses port 80 by default. Each alarm panel must be assigned a unique name such as TRI-TECH.tri-techmedical.com and the name DNS mapped to the corresponding alarm panels rabbit board IP address. It is recommended that the same panel name be used here when programming the rabbit board to avoid confusion. This mapping is set up using the software chosen for the reverse proxy server.

This is an example of how the website would look for a one gas (oxygen) area alarm module with a 4 – 20 mA master module for oxygen liquid level. Note there will be 16 ‘boxes’, one for each of the potential circuit boards on the alarm panel.



Below is an illustration of the event log. The event log is viewed by clicking on the Alarm Log button on the left side of the website (see above). This event log will display up to 100 recent events with the most recent event on the top line and the oldest event on the bottom line.

	START	END	ID	ALARM	STATE	NOTIFY
1.	3/18/2016 17:9:50	3/18/2016 17:11:11	1	SETUPCHANGE	CLOSED	1,2
2.	3/18/2016 17:9:44	3/18/2016 17:11:11	2		CLOSED	1,2
3.	3/18/2016 17:5:24	3/18/2016 17:7:4	1	SETUPCHANGE	CLOSED	1,2
4.	3/18/2016 17:3:50	3/18/2016 17:7:4	2	SETUPCHANGE	CLOSED	1,2
5.	3/18/2016 16:57:38	3/18/2016 16:59:10	1	HIGH PRESSURE	CLOSED	1,2
6.	2/18/1980 19:8:51	2/18/1980 19:9:46	1	LOW PRESSURE	CLOSED	
7.	2/18/1980 16:37:23	2/18/1980 16:38:16	1	LOW PRESSURE	CLOSED	
8.	2/18/1980 16:35:32	2/18/1980 16:37:12	1	HIGH PRESSURE	CLOSED	
9.	2/18/1980 15:0:57	2/18/1980 15:4:25	1	HIGH PRESSURE	CLOSED	
10.	2/18/1980 14:53:21	2/18/1980 15:0:46	1	LOW PRESSURE	CLOSED	
11.	2/18/1980 14:19:11	2/18/1980 14:53:9	1	HIGH PRESSURE	CLOSED	

BACnet Interface –

OVERVIEW

The 460MMBS Gateway device seamlessly connects Modbus RTU Slave devices to a BACnet/IP client. By following this guide, you will be able to configure the 460MMBS Gateway for basic operation. You will set the devices network settings and parameters to the proper configuration for initial operation and physically place the device in the network.

REQUIRED TOOLS AND DATA

- The 460MMBS Gateway
- The provided CD-ROM
- The provided Ethernet Crossover Cable
- A Working PC (Windows based)
- A 12-24 VDC power source

Connecting the 460MMBS Gateway device to the Alarm:

CAUTION: The Gateway device should only be installed after all wall construction and finishing is completed to prevent ingress of dust and debris. This contamination can adversely affect its proper function.

An Ethernet/Rabbit board should have already been installed in the back box and programmed as described in the previous pages. See the section on Integrating the Ethernet/Rabbit boards into a network.

The Gateway device configuration should be done at the Alarm panel. The device can be clipped to the provided bracket in the top right hand corner of the back box or be loose near the PC being used to configure the device.

The power for the 460MMBS Gateway device will come from the Orange (+) and Black (-) wires in the Alarm back box. Connect the orange wire to the plug labeled RED (+) and the black wire to the plug labeled BLACK (-). Refer to the wiring diagram on the page 55 for proper connections.

The RS485 data wires, blue, white and black, have been pre-wired to the input plug of the 460MMBS gateway. Connect the ends of these wires the “MODBUS/RS485” plug on the rabbit board, White wire to the “A” port, Blue wire to the “B” port and Black wire to “GRD” port. Refer to the wiring diagram on page 56 for proper connections.

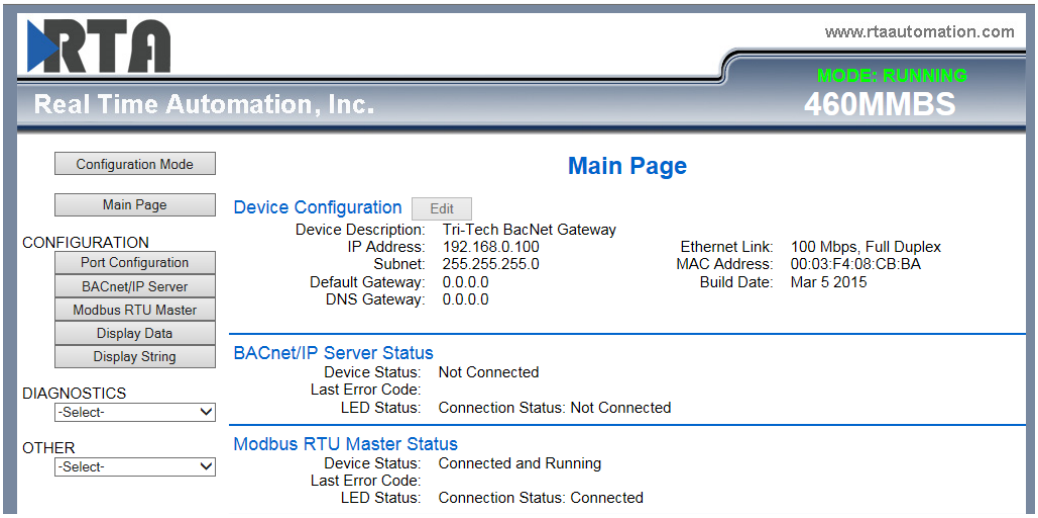
Always turn the power off to the alarm panel before making any electrical connections or disconnections.

BACnet Interface (continued) –

ACCESSING THE MAIN PAGE

Before you can configure the gateway itself, you must configure the network settings to connect the gateway. The following steps will connect the gateway properly.

1. Using the provided Ethernet crossover cable, connect the device to the PC.
2. Turn the power ON to the Alarm Panel and the PC.
3. The gateway device is shipped with a default IP Address of 192.168.0.100 and a Subnet of 225.255.255.0. Change the IP Address and Subnet of your PC, if necessary, to allow communication to the gateway device.
4. Open a Web browser and enter the device IP Address in the URL.
5. The Main page should appear as shown below.
6. Click on **Configuration Mode** in the upper left-hand corner of the screen.
7. Next to Device Configuration. Click the **Edit** button to modify the Network Settings.
8. Enter the new IP Address, Subnet, and Default Gateway to work in your network.
9. Click **Save Parameters** to save the network setting. Restart the gateway by clicking **Restart Now**.
10. Change your PC back to its original IP and Subnet setting for your network.
11. Enter the gateway's new IP Address in the Web browser to launch the Main Page.
12. Continue with the Gateway Port Configuration section.



NOTE - Browser configuration is compatible with Chrome, Internet Explorer, and Firefox.

BACnet Interface (continued) –

Gateway Port Configuration

1. On the Main Page, click on **Port Configuration**. It should appear as shown below.
2. Enable port 0 and set Mode to RS485 (2-wire: Half Duplex)
3. Set Serial Baud to 9600, Parity: None, Data Bits: 8, and Stop Bits 1.
4. Click **Save Parameters**. Return to Main Page.

If you are experiencing any difficulty programming the gateway device, insert the provided CD-ROM and refer to the trouble shooting section and other applicable tools on the CD.

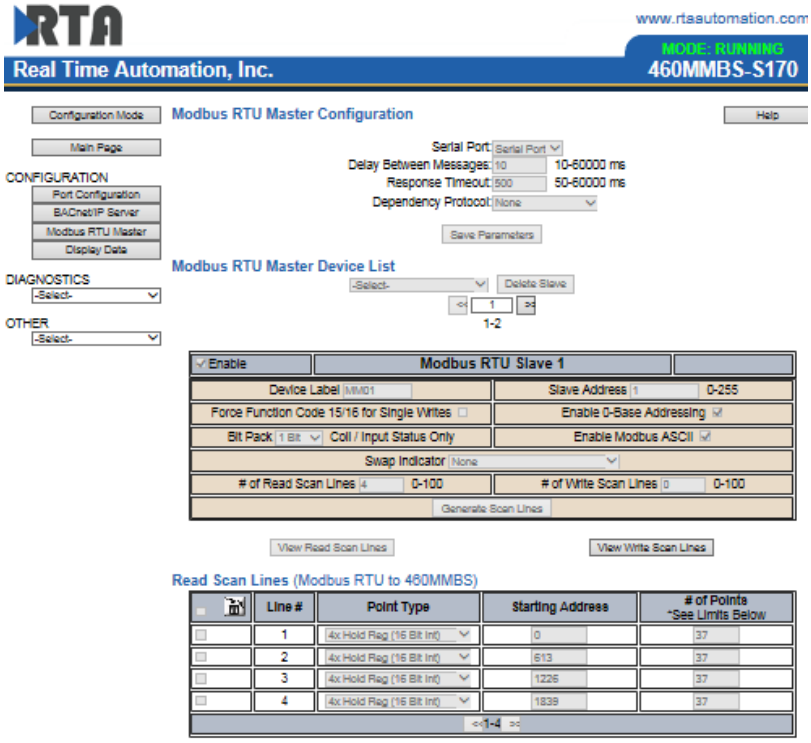
Modbus Interface -

A complete Modbus map for the largest Tri-Tech alarm panel is embedded in the rabbit board. You can view this on our website: www.tri-techmedical.com . An example of what the Modbus map looks like is shown below. The Board ID numbers in the left hand column refer to the boards COM ID numbers as explained on page 25. On the Modbus map, there is also an explanation of the values used within the map such as Board Type character 1 is a Gas Board or 2 is a Master Board etc.

Tri-Tech ModMap rev2 08/19/2016								
Board ID	MOD Name	Address	Gas/Master Description	Size	Word Size		4-20ma Description	Data Interpretation
ID 1	400000	0	CommFail	1 int (2 bytes)	1			
	400001	1	SetupChanged	1 int (2 bytes)	1		SetupChanged	SetupChanged
	400002	2	BoardType	1 int (2 bytes)	1		BoardType	System – DO NOT USE
	400003	3	Horn	1 int (2 bytes)	1		Horn	
	400004	4	ETextState	1 int (2 bytes)	1		EtextState	Board Types
	400005	5	MasterAlarm	1 int (2 bytes)	1		MasterAlarm	0=None
	400006	6	GasAlarm[0]	1 int (2 bytes)	1			1=Gas
	400007	7	GasAlarm[1]	1 int (2 bytes)	1			2=Master
	400008	8	GasAlarm[2]	1 int (2 bytes)	1			3=Gas Sensor Master
	400009	9	GasAlarm[3]	1 int (2 bytes)	1			4=4-20ma
	400010	10	Pressure[0]	1 int (2 bytes)	1		Current Value	
	400011	11	Pressure[1]	1 int (2 bytes)	1		Current Value	Horn
	400012	12	Pressure[2]	1 int (2 bytes)	1		Current Value	0=Horn Off
	400013	13	Pressure[3]	1 int (2 bytes)	1		Current Value	Not 0=Horn On
	400014	14	AlarmRepeatDelay	1 int (2 bytes)	1		AlarmRepeatDelay	
	400015	15	LogicType	1 int (2 bytes)	1		LogicType	EtextState
	400016	16	Language	1 int (2 bytes)	1		Language	0=Showing Normal
	400017	17	GasType[0]	1 int (2 bytes)	1			Not 0=Showing Etext
	400018	18	GasType[1]	1 int (2 bytes)	1			
	400019	19	GasType[2]	1 int (2 bytes)	1			MasterAlarm-Master Board Type
	400020	20	GasType[3]	1 int (2 bytes)	1			0=No Alarm
	400021	21	Units[0]	1 int (2 bytes)	1			Bit 0=1:Alarm 1
	400022	22	Units[1]	1 int (2 bytes)	1			Bit 1=1:Alarm 2
	400023	23	Units[2]	1 int (2 bytes)	1			Bit 2=1:Alarm 3
	400024	24	Units[3]	1 int (2 bytes)	1			Bit 3=1:Alarm 4
	400025	25	HiLimit[0]	1 int (2 bytes)	1		HiAlarm LS Word	Bit 4=1:Alarm 5
	400026	26	HiLimit[1]	1 int (2 bytes)	1		HiAlarm MS Word	Bit 5=1:Alarm 6
	400027	27	HiLimit[2]	1 int (2 bytes)	1		Scale 20ma LS Word	Bit 6=1:Alarm 7
	400028	28	HiLimit[3]	1 int (2 bytes)	1		Scale 20ma MS Word	Bit 7=1:Alarm 8
	400029	29	LoLimit[0]	1 int (2 bytes)	1		LoAlarm LS Word	
	400030	30	LoLimit[1]	1 int (2 bytes)	1		LoAlarm MS Word	MasterAlarm-Gas Board Type
	400031	31	LoLimit[2]	1 int (2 bytes)	1		Scale 4ma LS Word	0=No Alarm
	400032	32	LoLimit[3]	1 int (2 bytes)	1		Scale 4ma MS Word	1=Memory Error
	400033	33	PressureOffset[0]	1 int (2 bytes)	1			2=Broken Sensor Wire
	400034	34	PressureOffset[1]	1 int (2 bytes)	1			3=Sensor Comm Failure

Modbus Interface -

From the Main Page of the RTA website, click on Modbus RTU Master. An example Modmap of what is displayed is shown below. The Read Scan Lines are generated automatically by the Ethernet/Rabbit board and will match the configuration of the alarm panel. Individual informational items may be selected to communicated to the BACnet module for use on the building automation system.



BACnet/IP Server Settings

1. Click on the BACnet/ IP Server button. This will put the gateway into configuration mode so you can edit the BACnet settings.

2. Enter the Device instance that the 460MMBS will have on the BACnet/ IP Network. Note that this must be unique amongst all BACnet devices on the network.

3. In the Name field enter a unique name for the device.

4. The Description and Location fields are optional. Filling in this information is recommended to identify the device on a network.

5. Beneath the Read Groups, verify the number of Analog Input (AI), Analog Outlet (AO), Binary Input (BI) and Binary Output (BO) objects that you will be exposing to the BACnet/ IP Client.

6. Click Save Parameters.

7. To save changes and force the gateway back to running mode, click on the Reboot Now button and after 5 seconds hit the Refresh button. You should see the gateway appear in the Mode: Running.

Appendix A

Glossary of Terms

AC ***Alternating Current***
An electric current that reverses direction or polarity at regular intervals.

BAR A measurement of force in a compressed gas system. 1 BAR = 14.5 PSI or 1 BAR = 100 kPa

DC ***Direct Current***
An electric current that flows in one direction. The current can be steady or pulse.

inHg ***Inches of Mercury***
A measurement of the force in a gas vacuum system. 1 inHg = .49 PSI or 1 inHg = 25.4 mmHg

kPa ***Kilopascals***
A measurement of the force in a compressed gas system. 1 kPa = .14 PSI or 1kPa = .01 BAR

Latching Alarm Relay
Requires manual intervention (pressing the Silence button) to silence the alarm buzzer if the alarm condition has corrected itself

LCD ***Liquid Crystal Display***
A semiconductor liquid crystal film sealed between glass plates that changes its optical properties when voltage is applied.

LED ***Light Emitting Diode***
A semiconductor diode that converts applied voltage to light.

mmHG A measurement of force in a gas vacuum system. 1 mmHg = .019 PSI or 1 mmHg = .039 inHg

NFPA ***National Fire Protection Association***
The National Fire Protection Association is an association engaged in standards development.

NO ***Normally Open***
An electrical circuit in which the switch is normally open. No current flows through the circuit in normal operation. Only when the switch is closed is the flow of current started.

Non-Latching Alarm Relay
The alarm buzzer will silence itself when the alarm condition is corrected.

NC ***Normally Closed***
An electrical circuit in which the switch is normally closed. Current flows through the circuit in normal operation. Only when the switch is opened is the flow of current stopped.

PSI ***Pounds per Square Inch***
A measurement of the force in a compressed gas system. 1 PSI = 6.9 kPa or 1 PSI = .069 BAR

Transducer
A device that converts pressure into an electrical signal.

V ***Voltage***
Voltage is electrical pressure or force. One volt is equal to the difference of electrical potential between two points on a conducting wire carrying a constant current of one ampere when the power dissipated between the points is one watt.

Transient Signal
An intermittent and brief signal that quickly corrects and returns the alarm to a normal operating mode before monitoring personnel can silence the alarm.

Appendix B – Medical Gas Alarm Specifications

Operating Ambient Temperature range: +10C(50F) to +50C(122F)

Storage Temperature: -20C(-4F) to +85C(185F)

AC Input: 120 - 240 volts AC - 50-60 Hz

DC output (to remote signal devices): 5 VDC

Input Fuse: 5 amp input AC line fuse protects the input wiring to power supply

Power Consumption: 45W maximum @ 120 V
50 W maximum @ 240 V

Pressure Measurement Accuracy:

0-30 inHg transducer +/-1%
Vacuum, Gas Evacuation

0-100 PSIG transducer +/-1%
Oxygen, Nitrous Oxide, Medical Air, Carbon Dioxide

0-250PSIG transducer +/-1%
Nitrogen

Dimensions

Rough-in Box - All dimensions are in inches and cover the basic box only (mounting flange excluded)

Two vertical slot panel
8.125W x 11.875H x 4.000D

Three vertical slot panel
13.625W x 11.875H x 4.000D

Five vertical slot panel
19.625W x 11.875H x 4.000D

Front Panel

Two vertical slot panel
10.945W x 13.125H x 1.250D

Three vertical slot panel
14.870W x 13.125H x 1.250D

Five vertical slot panel
22.720W x 13.125H x 1.250D

Transducers: Housing dimensions: 1.990W x 1.990H x 3.625 Length including inlet fittings

Appendix C Signal Wire Color Code Log

Remote Signals

Signal Position #	Remote Signal Label	Signal Wire Color	Common Wire Color

Remote Signals

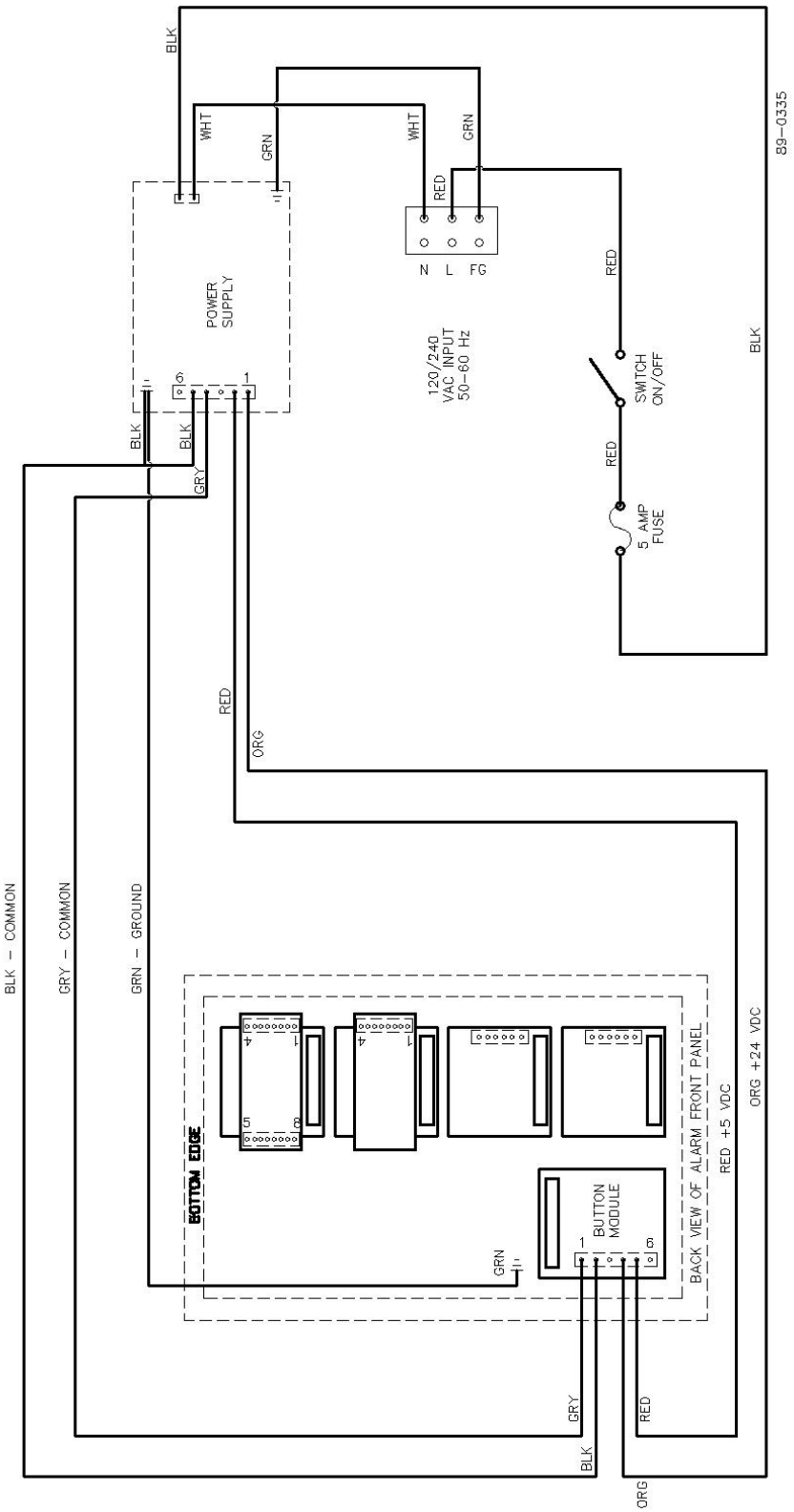
Signal Position #	Remote Signal Label	Signal Wire Color	Common Wire Color

The master alarm signals which are pre-loaded in the database (see page 24) will appear in the sequence below starting at the top of the first column to the bottom of the first column, then to the top of the second column to the bottom of the second column, etc. Using the back double arrow will start at the bottom of the fourth column and progress backwards. Master alarm signal has pre-loaded language sets please refer to page 26 on Programming language.

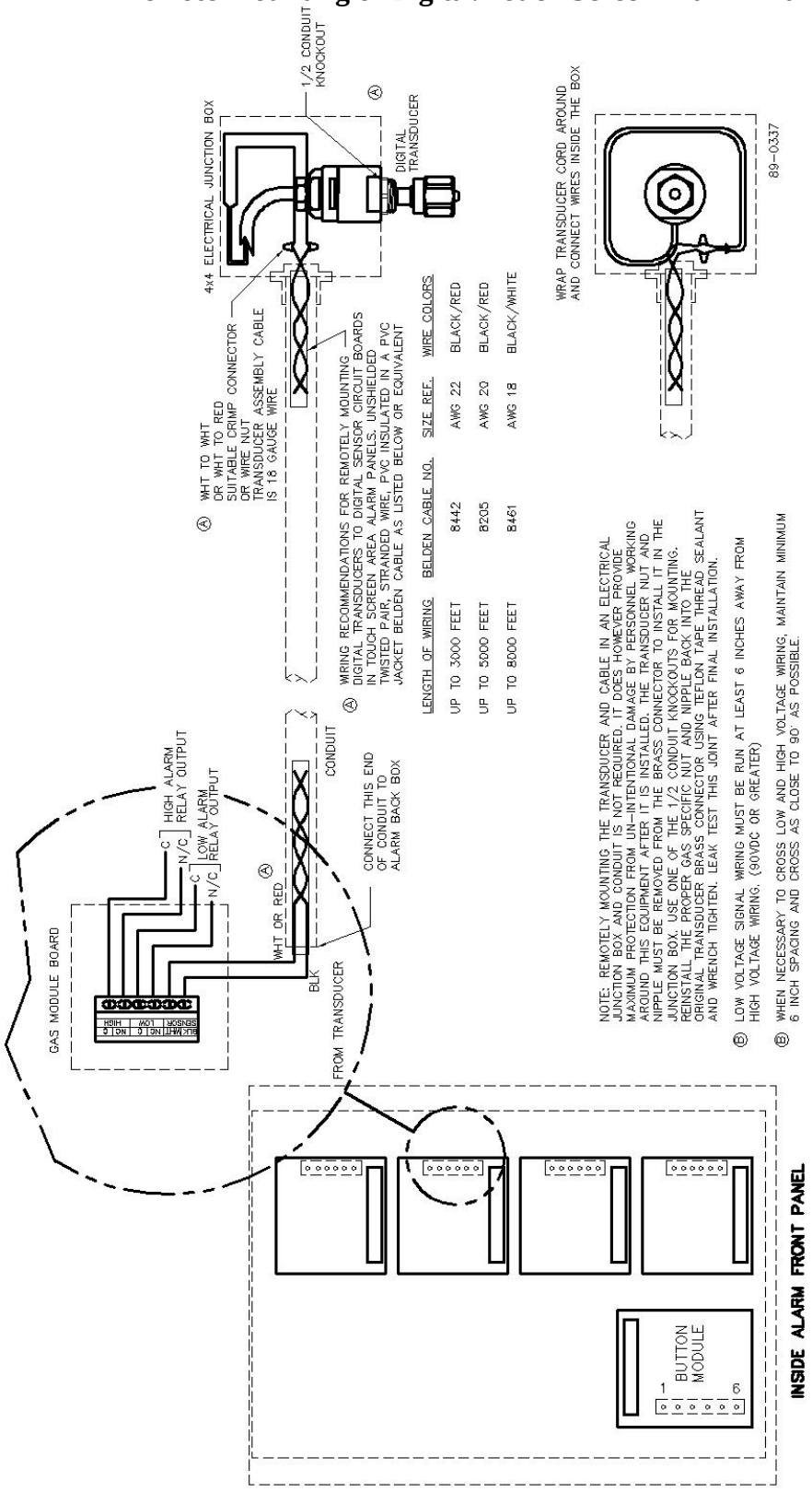
Oxygen **Main Liquid Level Low**	**Medical Air** **Hydrocarbons High**	**WAGD** **Main Line Low**	**Vacuum#1** **High Temperature**
Oxygen **Reserve Liquid Level Low**	**Medical Air** **Carbon Monoxide High**	**Nitrous Oxide** **Reserve Low Pressure**	**Vacuum#1** **Low Service Water**
Oxygen **Reserve Low Pressure**	**Medical Air** **Carbon Dioxide High**	**Nitrous Oxide** **Line Pressure High**	**Vacuum #2** **Lag / Failure**
Oxygen **Reserve in Use**	**Medical Air Compressor** **Transformer Failure**	**Nitrous Oxide** **Line Pressure Low**	**Vacuum #2** **Lag in Use**
Oxygen **Abnormal Line Pressure**	**Medical Air** **Secondary Supply in Use**	**Nitrous Oxide** **Secondary Supply In Use**	**Vacuum #2** **Motor Overload**
Oxygen **Line Pressure High**	**Medical Air** **Lag / Failure**	**Nitrous Oxide** **Main Liquid Level Low**	**Vacuum#2** **Transformer Failure**
Oxygen **Line Pressure Low**	**Medical Air** **Lag Pump In Use**	**Nitrous Oxide** **Reserve Liquid Level Low**	**Vacuum #2** **Low Oil Level**
Oxygen **Secondary Supply in Use**	**Medical Air** **Water in Receiver**	**Nitrous Oxide** **Reserve in Use**	**Vacuum#2** **High Temperature**
Carbon Dioxide **Reserve Low Pressure**	**Medical Air** **Receiver Flooded**	**Nitrogen** **Main Liquid Level Low**	**Vacuum#2** **Low Service Water**
Carbon Dioxide **Reserve in Use**	**Medical Air** **Dewpoint High**	**Nitrogen** **Reserve Liquid Level Low**	**Vacuum** **Lag / Failure**
Carbon Dioxide **Line Pressure High**	**Medical Air** **Dewpoint Low**	**Nitrogen** **Reserve Low Pressure**	**Vacuum** **Lag in Use**
Carbon Dioxide **Line Pressure Low**	**Medical Air** **Reserve in Use**	**Nitrogen** **Reserve in Use**	**Vacuum** **Motor Overload**
Carbon Dioxide **Secondary Supply in Use**	**Medical Air** **Reserve Low**	**Nitrogen** **Line Pressure High**	**Vacuum** **Transformer Failure**
Medical Air Dryer **Power Failure**	**Medical Air Dryer Tower** **Switching Failure**	**Nitrogen** **Line Pressure Low**	**Vacuum** **Low Oil Level**
Medical Air Dryer **High Temperature**	**Medical Air Dryer** **Low Outlet Pressure**	**Nitrogen** **Secondary Supply in Use**	**Vacuum** **High Temperature**
Medical Air Compressor **High Temperature**	**Instrument Air** **Line Pressure High**	**Vacuum #1** **Lag / Failure**	**Vacuum** **Low Service Water**
Medical Air Compressor **Motor Overload**	**Instrument Air** **Line Pressure Low**	**Vacuum #1** **Lag in Use**	**Vacuum** **Main Line Low**
Medical Air **Abnormal Line Pressure**	**Instrument Air** **Dewpoint High**	**Vacuum #1** **Motor Overload**	**Blank – Create your own**
Medical Air **Line Pressure High**	**WAGD** **Lag in Use**	**Vacuum#1** **Transformer Failure**	
Medical Air **Line Pressure Low**	**WAGD** **Pump High Temperature**	**Vacuum #1** **Low Oil Level**	

Appendix E

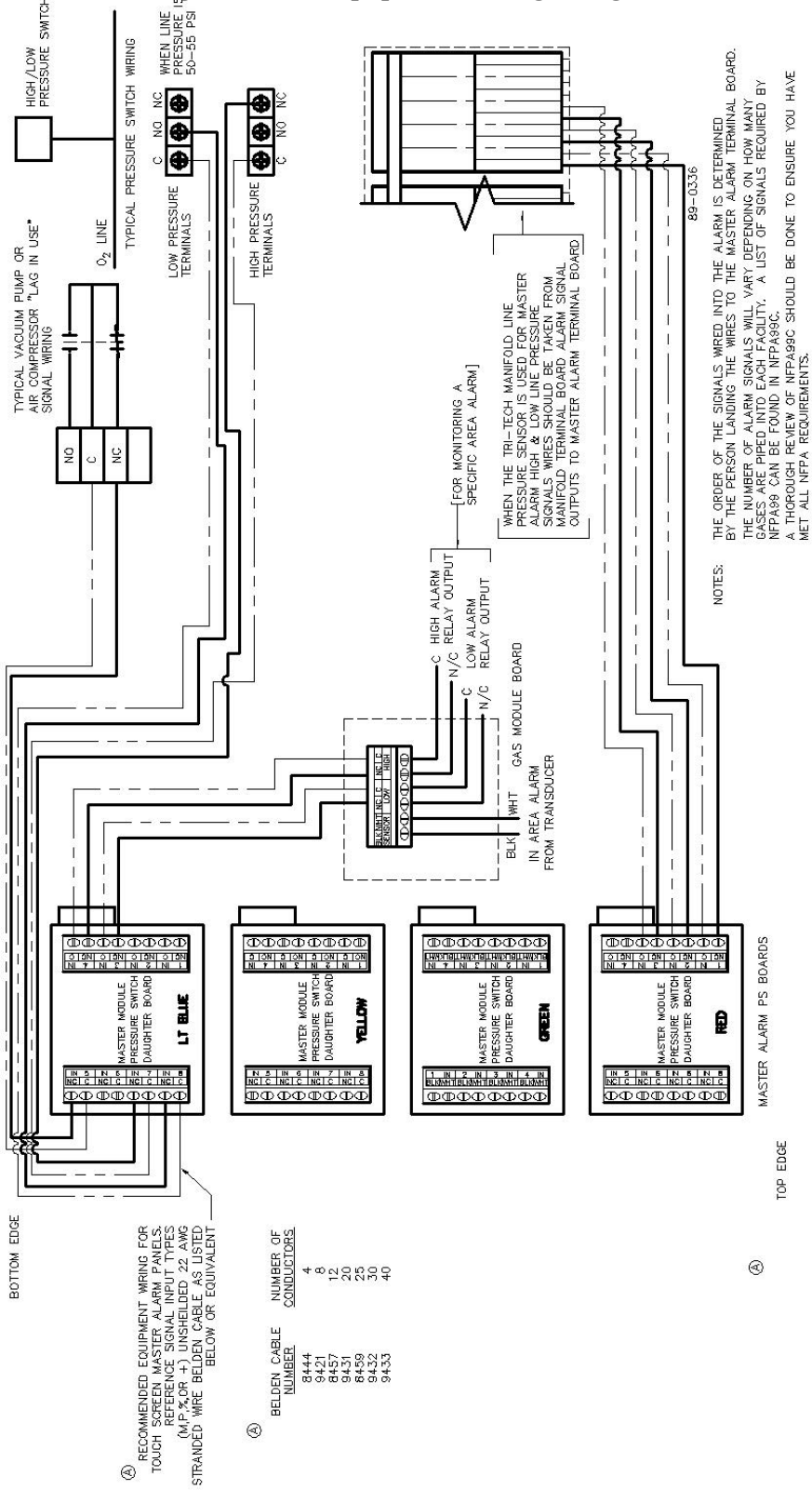
Digital Alarm or Master Alarm Wiring Schematic



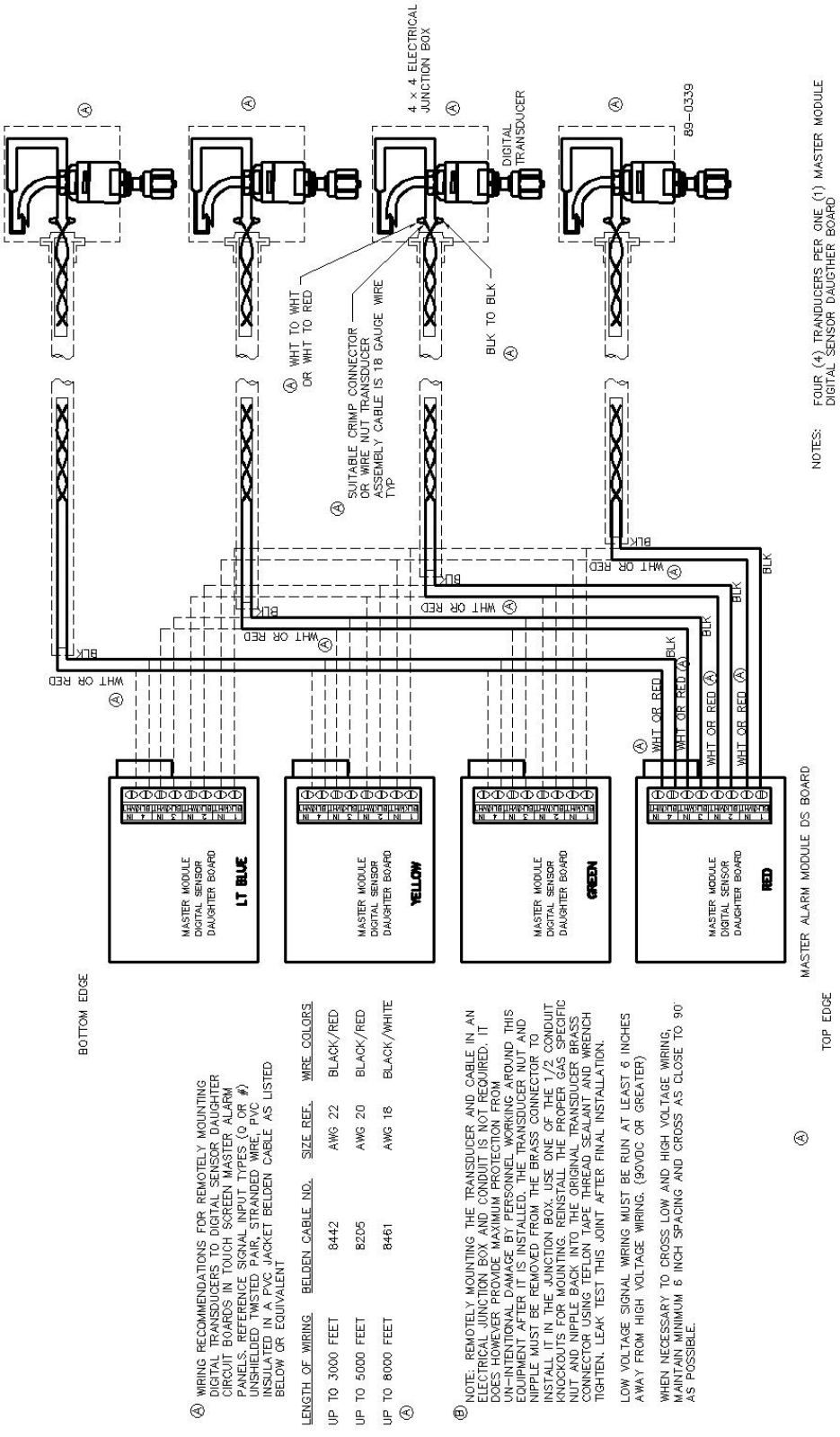
Appendix F Remote Mounting of Digital/Touch Screen Alarm Transducers



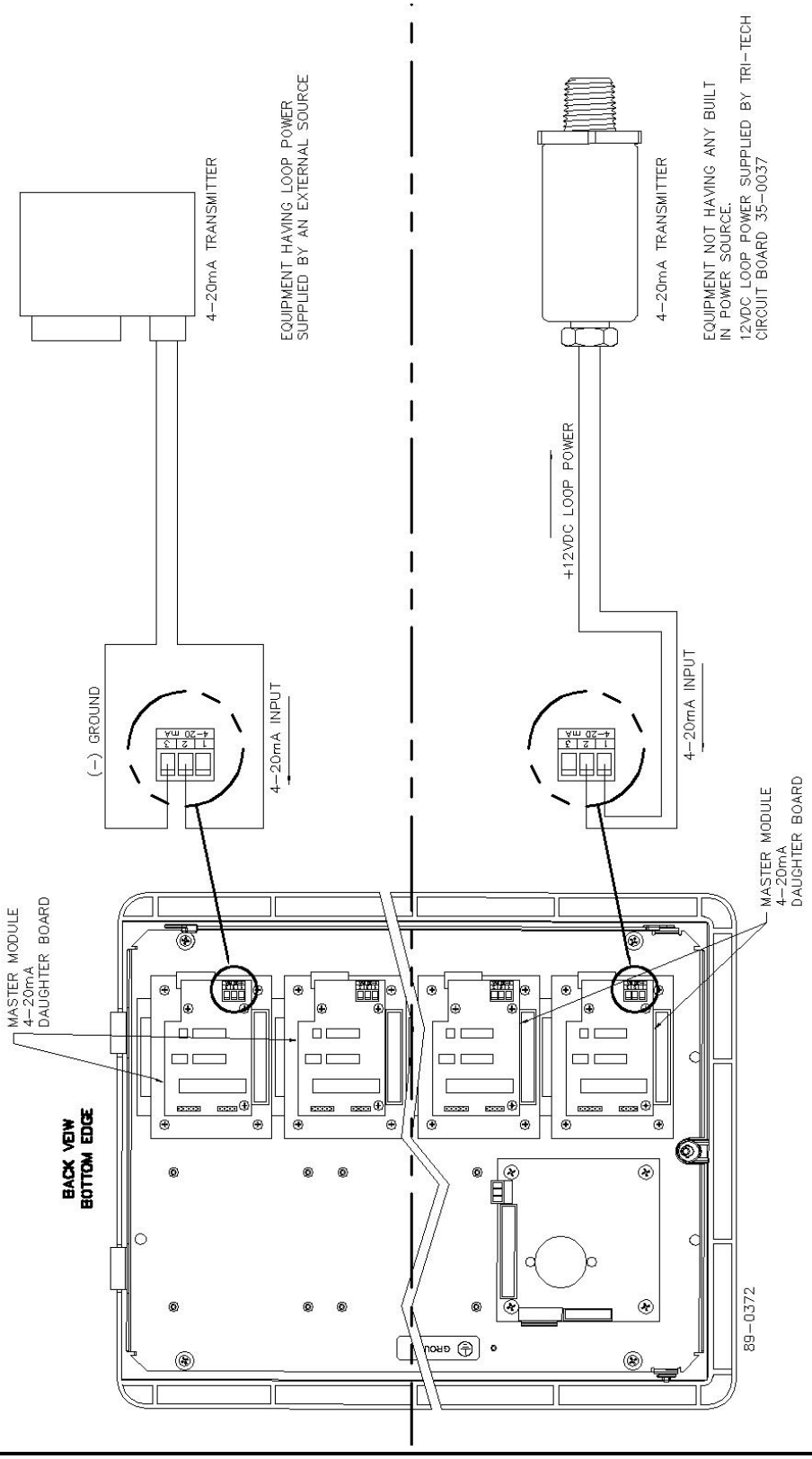
Appendix G Wiring Schematic Equipment Wiring to Digital/Touch Screen Master Alarm



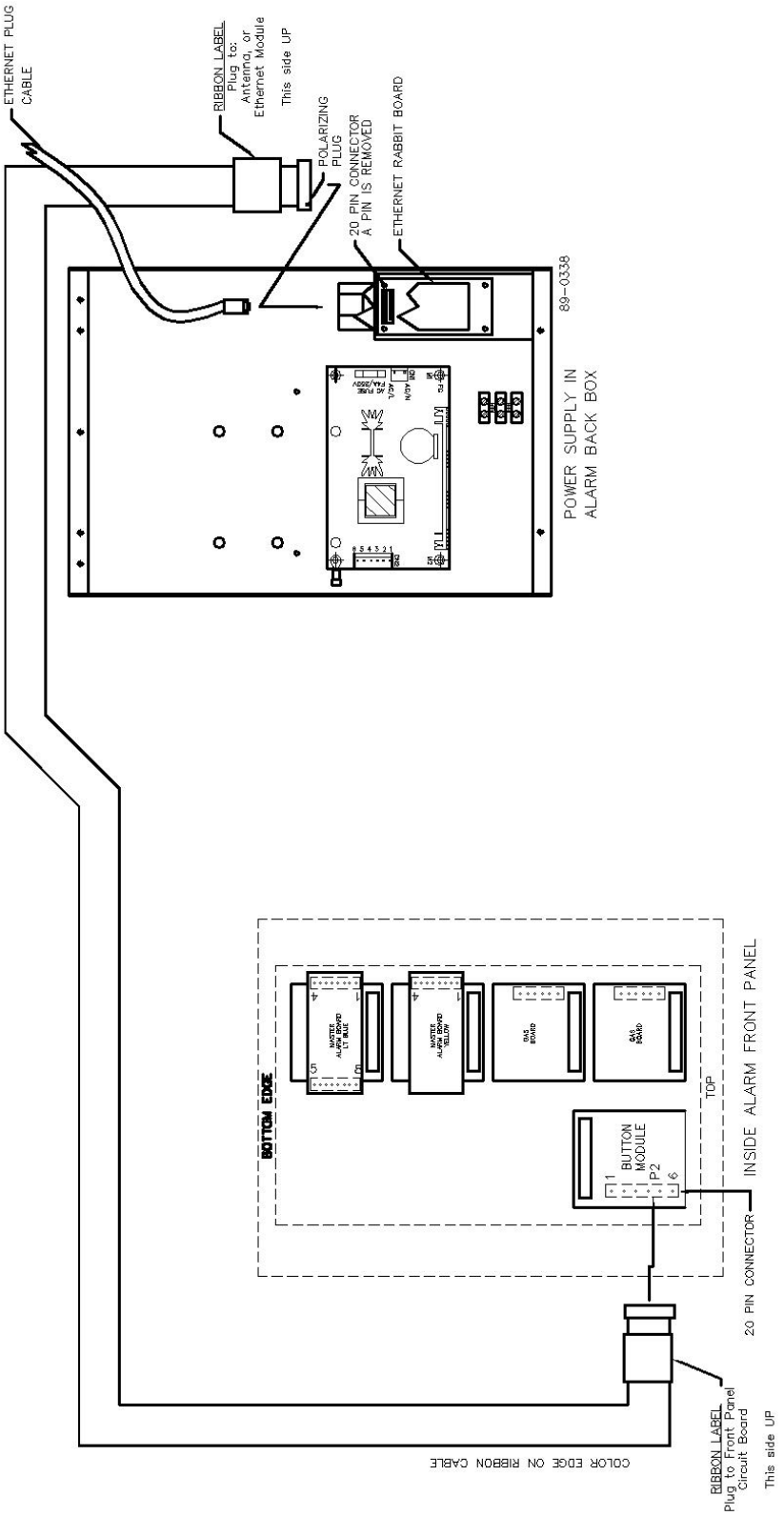
Appendix H Remote Mounting of Digital/Touch Screen Master Alarm Transducer



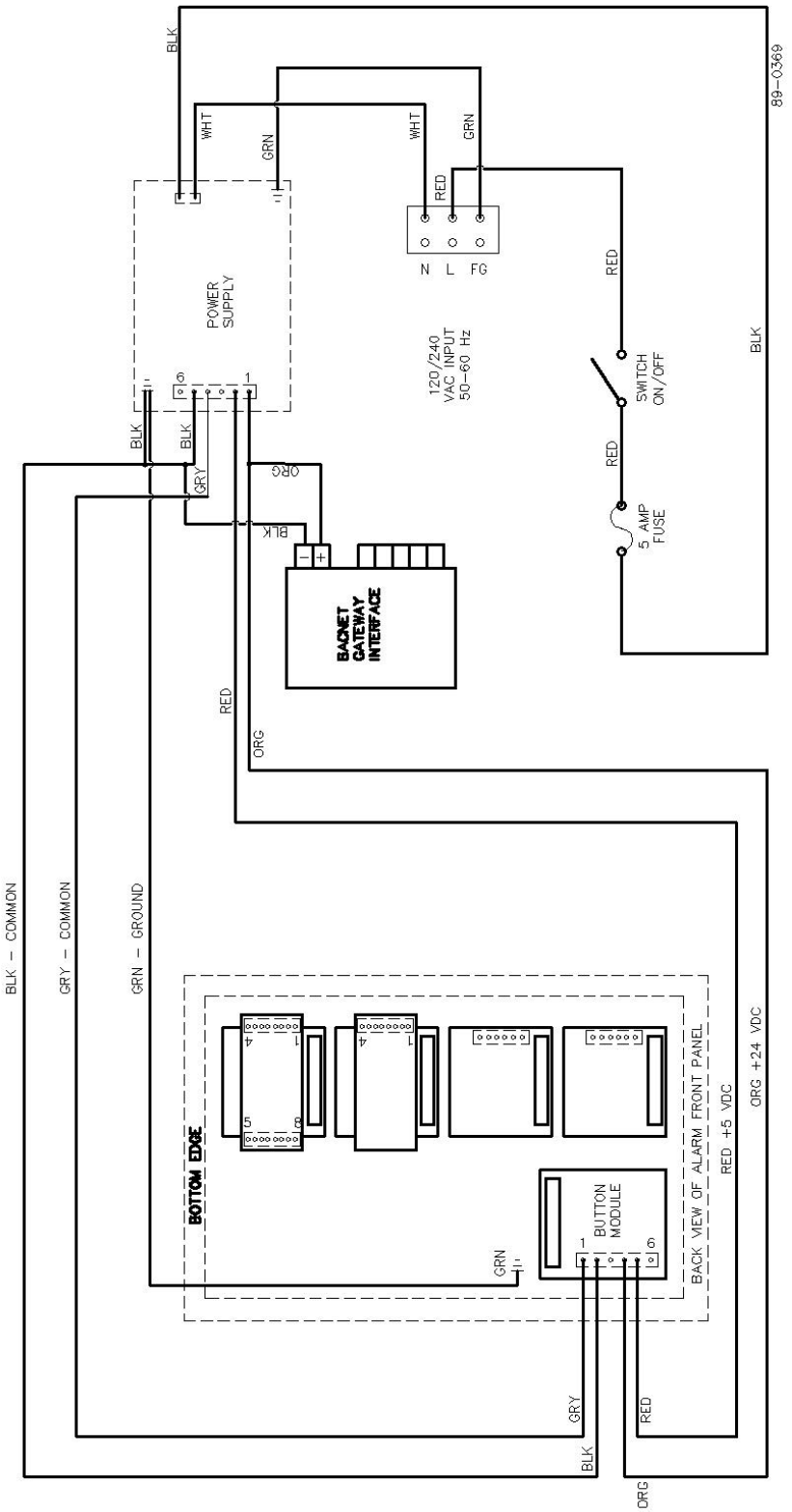
Appendix I Equipment wiring to Digital/Touch Screen 4-20mA Master Alarm



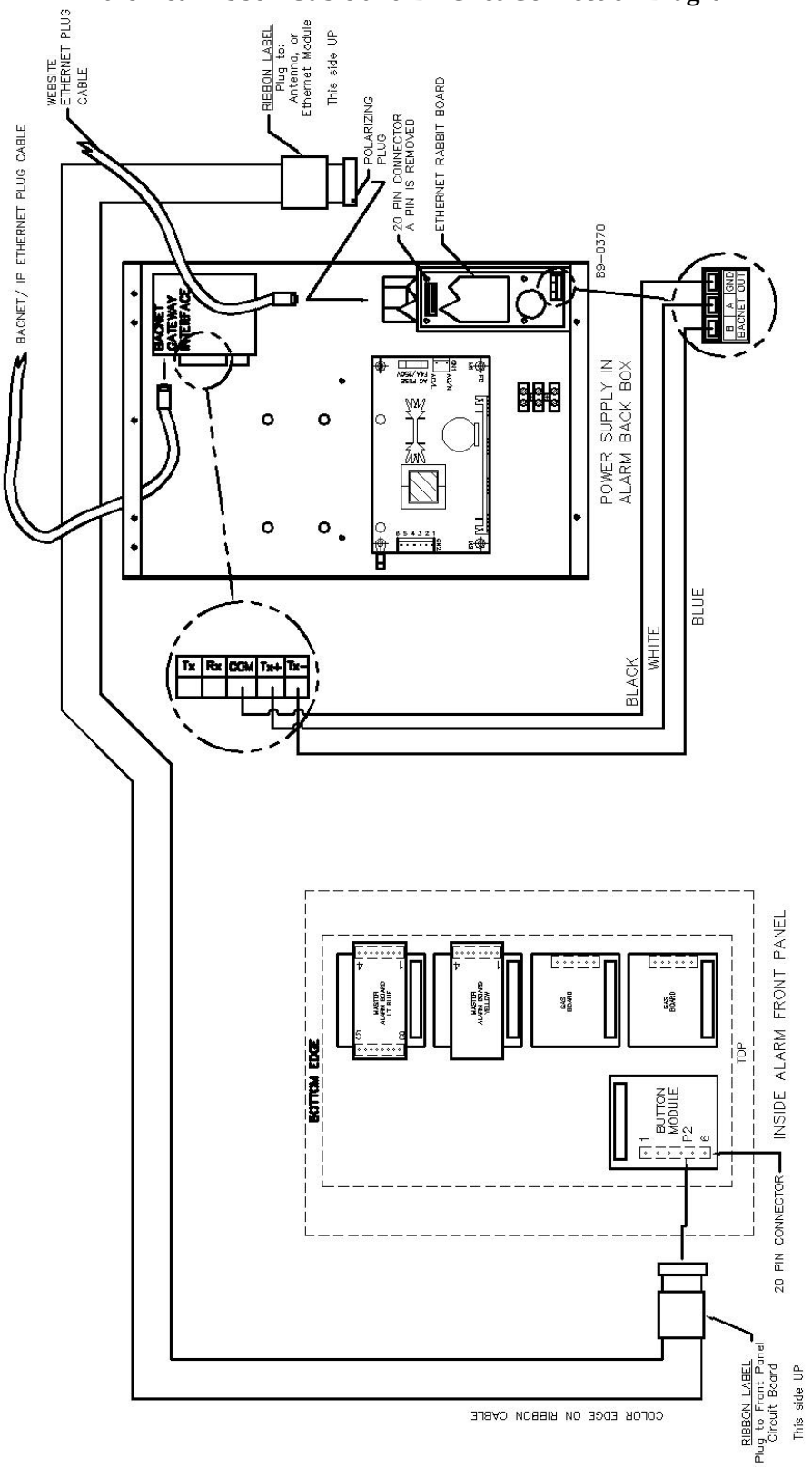
Appendix J Digital/Touch Screen Alarm Ethernet Ribbon Cable Connection Diagram



Appendix K Electrical Wiring Schematic with BACnet Interface



Appendix L Ethernet Ribbon Cable and BACnet Connection Diagram



Text Message Carriers

char Carriers[SMS_MAX_CARRIERS][2][64] = {

"@sms.3rivers.net",	"3 Rivers Wireless",
"@paging.acswireless.com",	"ACS Wireless",
"@advantagepaging.com",	"Advantage Communications",
"@airtouch.net",	"Airtouch Pagers",
"@airtouchpaging.com",	"Airtouch Pagers1",
"@alphapage.airtouch.com",	"Airtouch Pagers2",
"@myairmail.com",	"Airtouch Pagers3",
"@alltelmessage.com",	"Alltel",
"@message.alltel.com",	"Alltel PCS",
"@alphanow.net",	"AlphNow",
"@page.americanmessaging.net",	"American Messaging (SBC/Ameritech)",
"@clearpath.acswireless.com",	"Ameritech Clearpath",
"@paging.acswireless.com",	"Ameritech Paging",
"@pageapi.com",	"Ameritech Paging1",
"@airtelap.com",	"Andhra Pradesh Airtel",
"@archwireless.net",	"Arch Pagers (PageNet)",
"@epage.arch.com",	"Arch Pagers (PageNet)",
"@mmode.com",	"AT&T Free2Go",
"@mobile.att.net",	"AT&T PCS",
"@dpcs.mobile.att.net",	"AT&T Pocknet PCS",
"@txt.att.net",	"AT&T SMS",
"@sms.beemail.ru",	"BeeLine GSM",
"@beepwear.net",	"Beepwear",
"@message.bam.com",	"Bell Atlantic",
"@txt.bellmobility.ca",	"Bell Canada",
"@bellmobility.ca",	"Bell Canada",
"@txt.bell.ca",	"Bell Mobility (Canada)",
"@txt.bellmobility.ca",	"Bell Mobility",
"@bellsouthtips.com",	"Bell South (Blackberry)",
"@blsdcs.net",	"Bell South Mobility",
"@bellsouth.cl",	"Bell South",
"@blsdcs.net",	"Bell South",
"@sms.bellsouth.com",	"Bell South",
"@wireless.bellsouth.com",	"Bell South",
"@blueskyfrog.com",	"Blue Sky Frog",
"@sms.bluecell.com",	"Bluegrass Cellular",
"@myboostmobile.com",	"Boost Mobile",
"@bplmobile.com",	"BPL Mobile",
"@cwmovil.com",	"Cable & Wireless, Panama",
"@cmcpaging.com",	"Carolina Mobile Communications",
"@cwwsms.com",	"Carolina West Wireless",
"@phone.cellone.net",	"Cellular One East Coast",
"@paging.cellone-sf.com",	"Cellular One PCS",
"@swmsg.com",	"Cellular One South West",
"@mycellone.com",	"Cellular One West",
"@cell1.textmsg.com",	"Cellular One",
"@cellularone.textmsg.com",	"Cellular One",
"@cellularone.txtmsg.com",	"Cellular One",
"@message.cellone-sf.com",	"Cellular One",

Text Message Carriers

char Carriers[SMS_MAX_CARRIERS][2][64] = {

"@mobile.celloneusa.com",	"Cellular One",
"@sbcemail.com",	"Cellular One",
"@csouth1.com",	"Cellular South",
"@cwemail.com",	"Centennial Wireless",
"@cvcpaging.com",	"Central vermont Communications",
"@messaging.centurytel.net",	"CenturyTel",
"@rpgmail.net",	"Chennai RPG Cellular",
"@airtelchennai.com",	"Chennai Skycell/Airtel",
"@mobile.att.net",	"Cincinnati Bell",
"@mobile.mycingular.com",	"Cingular Wireless",
"@mobile.mycingular.net",	"Cingular Wireless",
"@mycingular.textmsg.com",	"Cingular Wireless",
"@cingularme.com",	"Cingular",
"@mms.cingularme.com",	"Cingular",
"@mycingular.com",	"Cingular",
"@mycingular.net",	"Cingular",
"@page.cingular.com",	"Cingular",
"@msg.clearnet.com",	"Clearnet",
"@comcastpcs.textmsg.com",	"Comcast",
"@pager.comspeco.com",	"Communication Specialist Companies",
"@pageme.comspeco.net",	"Communication Specialists",
"@sms.comviq.se",	"Comviq",
"@cookmail.com",	"Cook Paging",
"@corrwireless.net",	"Corr Wireless Communications",
"@airtelmail.com",	"Delhi Airtel",
"@delhi.hutch.co.in",	"Delhi Hutch",
"@page.hit.net",	"Digi-Page/Page Kansas",
"@mobile.dobson.net",	"Dobson Cellular Systems",
"@mobile.cellularone.com",	"Dobson-Alex Wireless",
"@mobile.cellularone.com",	"Dobson-Cellular One",
"@t-mobile-sms.de",	"DT T-Mobile",
"@sms.orange.nl",	"Dutchtone/Orange-NL",
"@sms.edgewireless.com",	"Edge Wireless",
"@sms.emt.ee",	"EMT",
"@escotelmobile.com",	"Escotel",
"@fido.ca",	"Fido",
"@sendabeep.net",	"Galaxy Corporation",
"@webpager.us",	"GCS Paging",
"@bplmobile.com",	"Goa BPLMobile",
"@sms.goldentele.com",	"Golden Telecom",
"@epage.porta-phone.com",	"Graylink/Porta-Phone",
"@airmessage.net",	"GTE",
"@gte.pagegate.net",	"GTE",
"@messagealert.com",	"GTE",
"@celforce.com",	"Gujarat Celforce",
"@messaging.sprintpcs.com",	"Helio",
"@text.houstoncellular.net",	"Houston Cellular",
"@ideacellular.net",	"Idea Cellular",
"@ivctext.com",	"Illinois Valley Cellular",

Text Message Carriers

char Carriers[SMS_MAX_CARRIERS][2][64] = {

"@page.infopagesystems.com",	"Infogage Systems",
"@inlandlink.com",	"Inland Cellular Telephone",
"@opensms.ipipi.com",	"IPIPI.COM",
"@jsmtel.com",	"JSM Tele-Page",
"@escotelmobile.com",	"Kerala Escotel",
"@airtelkol.com",	"Kolkata Airtel",
"@sms.kyivstar.net",	"Kyivstar-contract",
"@2sms.kyivstar.net",	"Kyivstar-prepaid",
"@e-page.net",	"Lauttamus Communication",
"@smsmail.lmt.lv",	"LMT",
"@pagemci.com",	"MCI",
"@bplmobile.com",	"Maharashtra BPL Mobile",
"@ideacellular.net",	"Maharashtra Idea Cellular",
"@text.mtsmobility.com",	"Manitoba Telecom Systems",
"@mci.com",	"MCI Phone",
"@pagemci.com",	"MCI",
"@mymeteor.ie",	"Meteor",
"@sms.mymeteor.ie",	"Meteor",
"@page.metrocall.com",	"Metrocall",
"@my2way.com",	"Metrocall 2-way",
"@mymetropcs.com",	"Metro PCS",
"@metropcs.sms.us",	"Metro PCS",
"@fido.ca",	"Microcell",
"@clearlydigital.com",	"Midwest Wireless",
"@m1.com.sg",	"MiWorld",
"@page.mobilcom.net",	"Mobilcom PA",
"@mobilecomm.net",	"Mobilcomm",
"@m1.com.sg",	"Mobileone",
"@page.mobilefone.com",	"Mobilfone",
"@ml.bm",	"Mobility Bermuda",
"@mobistar.be",	"Mobistar Belgium",
"@sms.co.tz",	"Mobitel Tanzania",
"@mobtel.co.yu",	"Mobtel Srbija",
"@beepone.net",	"Morris Wireless",
"@isp.com",	"Motient",
"@correo.movistar.net",	"Movistar",
"@text.mtsmobility.com",	"MTS",
"@bplmobile.com",	"Mumbai BPL Mobile",
"@orangemail.co.in",	"Mumbai Orange",
"@wirefree.informe.ca",	"NBTel",
"@sms.netcom.no",	"Netcom",
"@messaging.nextel.com",	"Nextel",
"@nextel.com.br",	"Nextel",
"@page.nextel.com",	"Nextel",
"@npiwireless.com",	"NPI Wireless",
"@pcs.ntelos.com",	"Ntelos",
"@mmail.co.uk",	"O2 (M-mail)",
"@o2.co.uk",	"O2",
"@o2imail.co.uk",	"O2",

Text Message Carriers

char Carriers[SMS_MAX_CARRIERS][2][64] = {

"@omnipoint.com",	"Omnipoint",
"@omnipointpcs.com",	"Omnipoint",
"@onemail.at",	"One Connect Austria",
"@onlinebeep.net",	"OnlineBeep",
"@optusmobile.com.au",	"Optus Mobile",
"@sms.orange.nl",	"Orange-NL/Dutchtone",
"@orangemail.co.in",	"Orange Mumbai",
"@orange.net",	"Orange",
"@mujoskar.cz",	"Oskar",
"@sms.luxgsm.lu",	"P&T Luxembourg",
"@pacbellpcs.net",	"Pacific Bell",
"@airmessage.net",	"PageMart Advanced/2way",
"@pmcl.net",	"PageMart Canada",
"@pagemart.net",	"PageMart",
"@pagegate.pagenet.ca",	"PageNet Canada",
"@page1nw.com",	"PageOne NorthWest",
"@pcsone.net",	"PCS One",
"@pelephone.net.il",	"Pelephone Israel",
"@pcom.ru",	"Personal Communication",
"@msg.pioneerenidcellular.com",	"Pioneer/Enid Cellular",
"@text.plusgsm.pl",	"PlusGSM",
"@bplmobile.com",	"Pondicherry BPL Mobile",
"@voicestream.net",	"Powertel",
"@txt.bell.ca",	"President's Choice",
"@mobilecell1se.com",	"Price Communications",
"@sms.primtel.ru",	"Primtel",
"@page.propage.net",	"ProPage",
"@sms.pscel.com",	"Public Service Cellular",
"@pager.qualcomm.com",	"Qualcomm",
"@qwestmp.com",	"Qwest",
"@ram-page.com",	"RAM Page",
"@pcs.rogers.com",	"Rogers AT&T Wireless",
"@pcs.rogers.com",	"Rogers Canada",
"@safaricomsms.com",	"Safaricom",
"@satelindogsm.com",	"Satelindo GSM",
"@satellink.net",	"Satellink",
"@paging.acswireless.com",	"SBC Ameritech Paging",
"@email.swbw.com",	"Southwestern Bell",
"@messaging.sprintpcs.com",	"Sprint",
"@scs-900.ru",	"SCS-900",
"@sfr.fr",	"SFR France",
"@text.simplefreedom.net",	"Simple Freedom",
"@email.skytel.com",	"Skytel Pagers",
"@skytel.com",	"Skytel Pagers",
"@mysmart.mymobile.ph",	"Smart Telecom",
"@page.southernlinc.com",	"Southern LINC",
"@email.swbw.com",	“Southwestern Bell",
"@messaging.sprintpcs.com",	"Sprint PCS",
"@sprintpaging.com",	"Sprint",

Text Message Carriers

char Carriers[SMS_MAX_CARRIERS][2][64] = {

"@page.stpaging.com",	"ST Paging",
"@tms.suncom.com",	"Suncom",
"@suncom1.com",	"Suncom",
"@freesurf.ch",	"Sunrise Mobile",
"@mysunrise.ch",	"Sunrise Mobile",
"@mobile.surewest.com",	"Surewest Communications",
"@bluewin.ch",	"Swisscom",
"@bplmobile.com",	"Tamil Nadu BPL Mobile",
"@tmomail.net",	"T-Mobile",
"@sms.tele2.lv",	"Tele2 Latvia",
"@movistar.net",	"Telefonica Movistar",
"@mobilpost.no",	"Telenor",
"@pageme.teletouch.com",	"Teletouch",
"@msg.telus.com",	"Telus",
"@pager.tdspager.com",	"The Indiana Paging Co",
"@timnet.com",	"TIM",
"@t-mobile.uk.net",	"T-Mobile UK",
"@voicestream.net",	"T-Mobile",
"@tmomail.net",	"T-Mobile",
"@txt.att.net",	"Tracfone",
"@tms.suncom.com",	"Triton",
"@alphame.com",	"TSR Wireless",
"@beep.com",	"TSR Wireless",
"@sms.umc.com.ua",	"UMC",
"@utext.com",	"Unicel",
"@sms.uraltel.ru",	"Uraltel",
"@email.uscc.net",	"US Cellular",
"@uscc.textmsg.com",	“US Cellular",
"@uswestdatamail.com",	"US West",
"@escotelmobile.com",	"Uttar Pradesh Escotel",
"@myairmail.com",	"Verizon Pagers",
"@myvzw.com",	"Verizon PCS (MMS)",
"@vswpix.com",	"Verizon PCS (MMS)",
"@vtext.com",	"Verizon PCS (SMS)",
"@pager.irkutsk.ru",	"Vessotel",
"@vmobile.ca",	"Virgin Mobile (CA)",
"@vmobl.com",	"Virgin Mobile (US)",
"@vxtras.com",	"Virgin Mobile",
"@voicestream.net",	"VoiceStream/T-Mobile",
"@airmessage.net",	"WebLink Wireless",
"@pagemart.net",	"WebLink Wireless",
"@webtext.com",	"WEBTEXT",
"@sms.wcc.net",	"West Central Wireless",
"@cellularonewest.com",	"Western Wireless",
"@sms.wildmist.net",	"Wildmist Wireless",
"@wyndtell.com",	"Wyndtell"

Appendix N **Ethernet/Rabbit Board Programming Log**

List the information used for Programming the Alarm (s) Ethernet/Rabbit Board using the commands on page 37.

Common Commands	
(PPN) *Program Panel Name*	
(PIP) *Program IP*	
(PGW) *Program Gateway IP*	
(PMI) *Program SMTP Mail Server IP*	
(PUN) *Program User Name*	
(PUP) *Program User Password*	
(PCX) *Program Contacts for Alarm Panel ____*	
1	
2	
3	
4	
5	

Common Commands	
(PPN) *Program Panel Name*	
(PIP) *Program IP*	
(PGW) *Program Gateway IP*	
(PMI) *Program SMTP Mail Server IP*	
(PUN) *Program User Name*	
(PUP) *Program User Password*	
(PCX) *Program Contacts for Alarm Panel ____*	
1	
2	
3	
4	
5	

Common Commands	
(PPN) *Program Panel Name*	
(PIP) *Program IP*	
(PGW) *Program Gateway IP*	
(PMI) *Program SMTP Mail Server IP*	
(PUN) *Program User Name*	
(PUP) *Program User Password*	
(PCX) *Program Contacts for Alarm Panel ____*	
1	
2	
3	
4	
5	

This page is left Intentionally Blank

Tri-Tech Medical Inc.

Tel. 1-800-253-8692 -or- 440-937-6244 Fax. 440-937-5060

Web site www.tri-techmedical.com E mail address: sales@tri-techmedical.com