Manufactured by
Interscan Corporation
21700 Nordhoff Street
Chatsworth, CA 91311

4 Point Continuous Ethylene Oxide Monitoring System

OPERATION & MAINTENANCE MANUAL

Table of Contents

Section

1

Introduction

1.1 Component Check

Check the contents list in each shipping container used to ship your system and ensure that all system accessories on the list(s) are included. Set all accessories aside until directed to install them later in the manual.

1.2 System Description

The Interscan PLC-420 Ethylene Oxide Monitoring System consists of the Interscan gas sensor (one per sampling point), sample draw pneumatics, a **P**rogrammable **L**ogic **C**ontroller or PLC, an **O**perator **C**ontrol **P**anel or OCP and various alarm output devices.

In basic operation sample air is drawn through each sensor, via a diaphragm sample pump and related pneumatics. The sensor's electrical output is sent via the sensor circuit board to the PLC which processes the sensor outputs and produces a digital readout in PPM (parts per million) on the OCP. The PLC also compares the current gas level to preset alarm levels and activates alarm indicators when gas levels exceed these user set levels. The OCP provides for monitoring of all current gas levels as well as any current and past alarm and fault conditions. The OCP also allows for user control of the pumps, setting of alarm levels and manipulation of various maintenance modes for the system.

ALL INTERSCAN MONITORS ARE CALIBRATED AT THE FACTORY PRIOR TO SHIPMENT. Unless the **CAL** control is inadvertently changed, no calibration is required until the unit has seen considerable use.

Section

2

Installation

2.1 Enclosure Mounting

The *Interscan* PLC-420 Monitoring System is housed in a NEMA 12 30”W X 36”H X 8”D enclosure. The enclosure is configured for wall mounting. The outer door is hinged on the left side, and the control panel is hinged on the bottom. For optimum access, enough room should be allowed to fully open the outer door. Secure the enclosure to the wall using 3/8 inch (9.525 mm) or 7/16 inch (11.113 mm) steel bolts. See figures 2-1 and 2-2 below for dimensional detail (only the furthest extruding exterior components are shown).

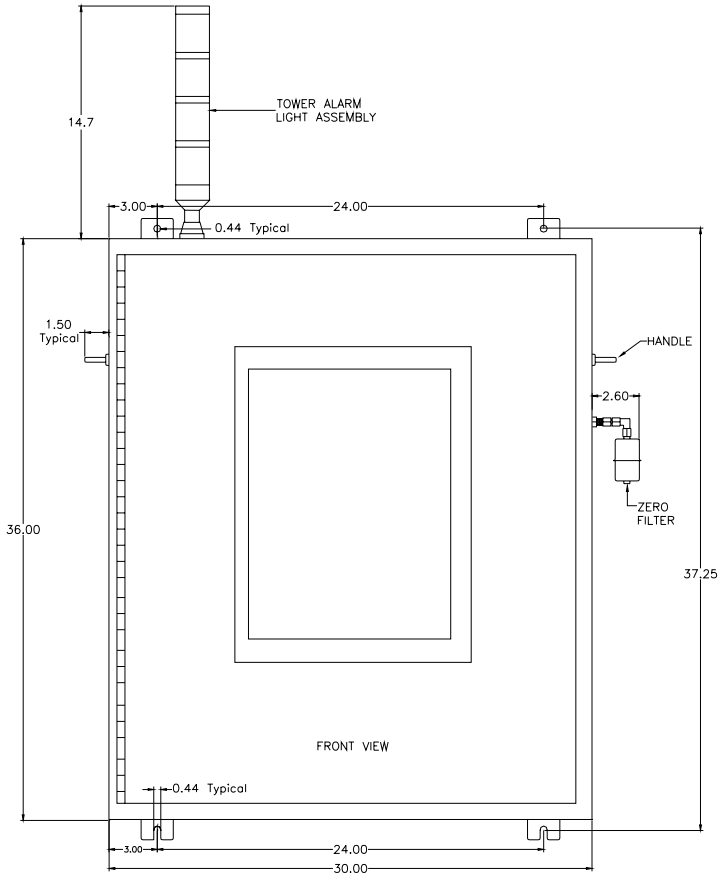

FIG. 2–1

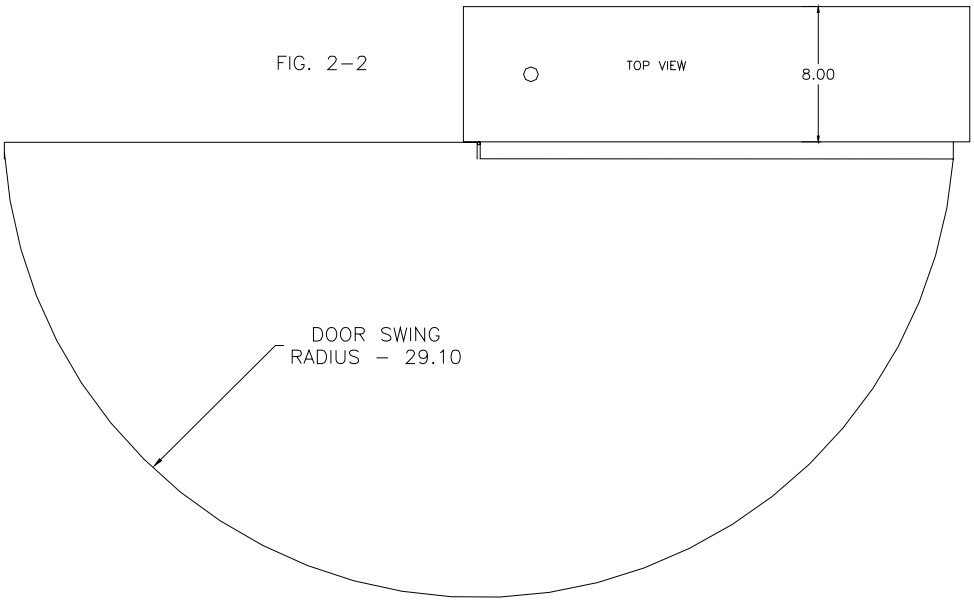

FIG. 2–2

2.2 Plumbing The System

2.2.1 SAMPLE POINT STATIONS

Each sensor has a remote sample point station that houses the inlet particulate filter for the associated sample inlet (see figure 2-3). Each station should be installed in the immediate area from which gas sample is to be taken for the given sample point. They are configured for wall or ceiling mounting using #10 or similar size screws. Ease of access should be considered for filter replacement.

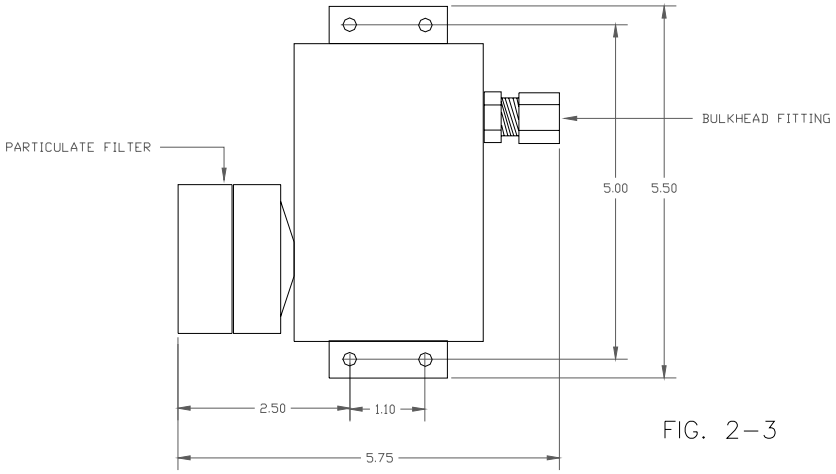

FIG. 2–3

2.2.2 ENCLOSURE FITTINGS AND CONNECTIONS

Sample air is drawn into and exhausted from the system via as series of ¼ inch (6.35 mm) OD compression type bulkhead fittings located on the top and right side of the system enclosure. The locations, and purposes of the various fittings are detailed below.

INLET 1-4 Front row of fittings located on the top of the system enclosure. These fittings connect to sample point stations as described in section 2.2.3.

EXHAUST 1- 4 Middle row of fittings on the top of the system enclosure. These fittings should be connected to an exhaust vent or manifold. If an exhaust manifold is used, it must have a minimum of 3.5 inch (88.9 mm) ID.

CAL INLET Located on the system front panel inside the enclosure door.. The CAL INLET is a "push-in" style bulkhead fitting provided for gas introduction during the calibration procedure (see section 4.6.)

ZERO AIR Located on the right side of the system enclosure. A bulkhead fitting for connection of the blue KOBY charcoal canister filter through which ambient air is drawn during the manual zero procedure (see section 4.5)

2.2.3 SAMPLE TUBING

Each sample point station connects via its stainless bulkhead fitting to the associated sample inlet bulkhead on the top of the system enclosure using an appropriate length of Bev-a-line sample tubing. *Interscan* provides 50ft. of Bev-a-line tubing for each sample point.

2.2.4 ZERO AIR FILTER

The ZERO AIR FILTER is the blue *KOBY* canister style charcoal filter that is used to scrub out sensor reactant gases during the manual zero procedure to obtain a true zero sample. Connect this filter by screwing the nut at the end of the elbow fitting attached to the filter onto the ZERO AIR bulkhead fitting on the right side of the enclosure. Tighten snugly.

2.3 Electrical Connections

2.3.1 POWER CONNECTION

The system power wiring connections are made to terminal block #1 (TB1) which is located at the upper left edge of the unit chassis. Field wiring should be run into the uppermost 1/2 inch conduit hub located on the upper left outside of the Hoffman NEMA 12 enclosure. Supply voltage should be rated @ 120 VAC / 60 Hz. / 5 Amps. Wiring connections for 120 VAC In - TB1 are as follows:

TERMINAL	DESCRIPTION
TB1-1	120 VAC Hot
TB1-2	120 VAC Neutral
TB1-3	Ground

2.3.2 TOWER LIGHTS & AUDIBLE ALARM

The Idec tower light stack connects to the conduit hub, on the top left of the unit enclosure. Wiring connections are made to terminal block #2 (TB2) located at the upper left edge of the unit chassis. The Piezoelectric audible horn is fixed installed on the top left side of the enclosure and is factory wired to TB2.

Wiring connections for **Tower Lights & Audible Alarm - TB2** are as follows:

TERMINAL	DESCRIPTION
TB2-1	Low Alarm (Blue) Light - 120 VAC Line ***(Blue Wire)***
TB2-2	High Alarm (Red) Light - 120 VAC Line ***(Red Wire)***
TB2-3	Fault (Amber) Light - 120 VAC Line ***(Yellow Wire)***
TB2-4	Audible Alarm - 120 VAC Line ***(pre-wired)***
TB2-5	Common - 120 VAC Neutral ***(White Wire)***

2.3.3 LOW & HIGH ALARM RELAY CONTACTS

The low alarm relay contacts are terminated at terminal block #3 (TB3). The high alarm contacts are terminated at terminal block #4 (TB4). Both can be found on the stacked relay boards located

along the upper left side of the unit chassis. Contact designations are labeled on the relay board edges. Field wiring should be run into the middle 1/2" conduit hub, located at the upper-middle left side of the Hoffman NEMA 12 enclosure. All low alarm relay contacts are Form C contacts rated @ 5 amps.

Wiring for **Low Alarm** relay contacts are as follows:

TERMINAL	DESCRIPTION
TB3-1C	Sample Point #1 Low Alarm Common
TB3-1NO	Sample Point #1 Low Alarm Normally Open
TB3-1NC	Sample Point #1 Low Alarm Normally Closed
TB3-2C	Sample Point #2 Low Alarm Common
TB3-2NO	Sample Point #2 Low Alarm Normally Open
TB3-2NC	Sample Point #2 Low Alarm Normally Closed
TB3-3C	Sample Point #3 Low Alarm Common
TB3-3NO	Sample Point #3 Low Alarm Normally Open
TB3-3NC	Sample Point #3 Low Alarm Normally Closed
TB3-4C	Sample Point #4 Low Alarm Common
TB3-4NO	Sample Point #4 Low Alarm Normally Open
TB3-4NC	Sample Point #4 Low Alarm Normally Closed

Wiring for **High Alarm** relay contacts are as follows:

TERMINAL	DESCRIPTION
TB4-1C	Sample Point #1 High Alarm Common
TB4-1NO	Sample Point #1 High Alarm Normally Open
TB4-1NC	Sample Point #1 High Alarm Normally Closed
TB4-2C	Sample Point #2 High Alarm Common
TB4-2NO	Sample Point #2 High Alarm Normally Open
TB4-2NC	Sample Point #2 High Alarm Normally Closed
TB4-3C	Sample Point #3 High Alarm Common
TB4-3NO	Sample Point #3 High Alarm Normally Open
TB4-3NC	Sample Point #3 High Alarm Normally Closed
TB4-4C	Sample Point #4 High Alarm Common
TB4-4NO	Sample Point #4 High Alarm Normally Open
TB4-4NC	Sample Point #4 High Alarm Normally Closed

2.3.4 REMOTE STROBE LIGHTS & AUDIBLE ALARMS (OPTIONAL)

The remote alarm outputs (if provided) are relay switched, 24V DC powered terminal block outputs for wiring in external 24V DC devices. Connections are made through the lower-most conduit hub, on the middle left side of the enclosure. Wiring connections are made to terminal block #5 (TB5) located at the lower-middle left edge of the unit chassis.

Wiring connections for ***Dedicated*** **(per point) and *Common* (any point) Remote Flasher Lights & Audible Alarms -** are as follows:

TERMINAL	**DESCRIPTION**
TB5-1	Low Alarm Output Pt #1 – 120VAC
TB5-2	High Alarm Output Pt #1 – 120VAC
TB5-3	Output Common Pt. #1 – ACN
TB5-4	Low Alarm Output Pt #2 - 120VAC
TB5-5	High Alarm Output Pt #2 - 120VAC
TB5-6	Output Common Pt. #2 - ACN
TB5-7	Low Alarm Output Pt #3 - 120VAC
TB5-8	High Alarm Output Pt #3 - 120VAC
TB5-9	Output Common Pt. #3 - ACN
TB5-10	Low Alarm Output Pt #4 - 120VAC
TB5-11	High Alarm Output Pt #4 - 120VAC
TB5-12	Output Common Pt. #4 - ACN
TB5-13	Common Low Alarm Output - 120VAC
TB5-14	Common High Alarm Output - 120VAC
TB5-15	Output Common – ACN

2.3.5 ANALOG OUTPUTS

The PLC-420 Monitor is equipped with a 4-20mA analog output for each sample point where 4 mA corresponds to **0 ppm** on the display readout and 20 mA corresponds to **50.0 ppm** on the display readout. Wiring connections for these outputs are made to terminal block #6 (TB6) located along the left side of the interior panel. Field wiring should be run into the either of the lower pair of 1/2" conduit hubs, located at the upper-middle left side of the Hoffman NEMA 12 enclosure.

Wiring connections for **TB6 - Recorder Outputs** are as follows:

TERMINAL	**DESCRIPTION**

TB6-1	Sample Point #1 4-20 mA Output
TB6-2	Sample Point #1 4-20 mA Return
TB6-3	Sample Point #2 4-20 mA Output
TB6-4	Sample Point #2 4-20 mA Return
TB6-5	Sample Point #3 4-20 mA Output
TB6-6	Sample Point #3 4-20 mA Return
TB6-7	Sample Point #4 4-20 mA Output
TB6-8	Sample Point #4 4-20 mA Return

Section

3

Quick Start – Basic Functions and Features

This section gives a brief overview of the system's most basic functions. A full reading of the manual is recommended for a thorough understanding of all unit functions. Refer to Figure 3-1 below for control designations and locations.

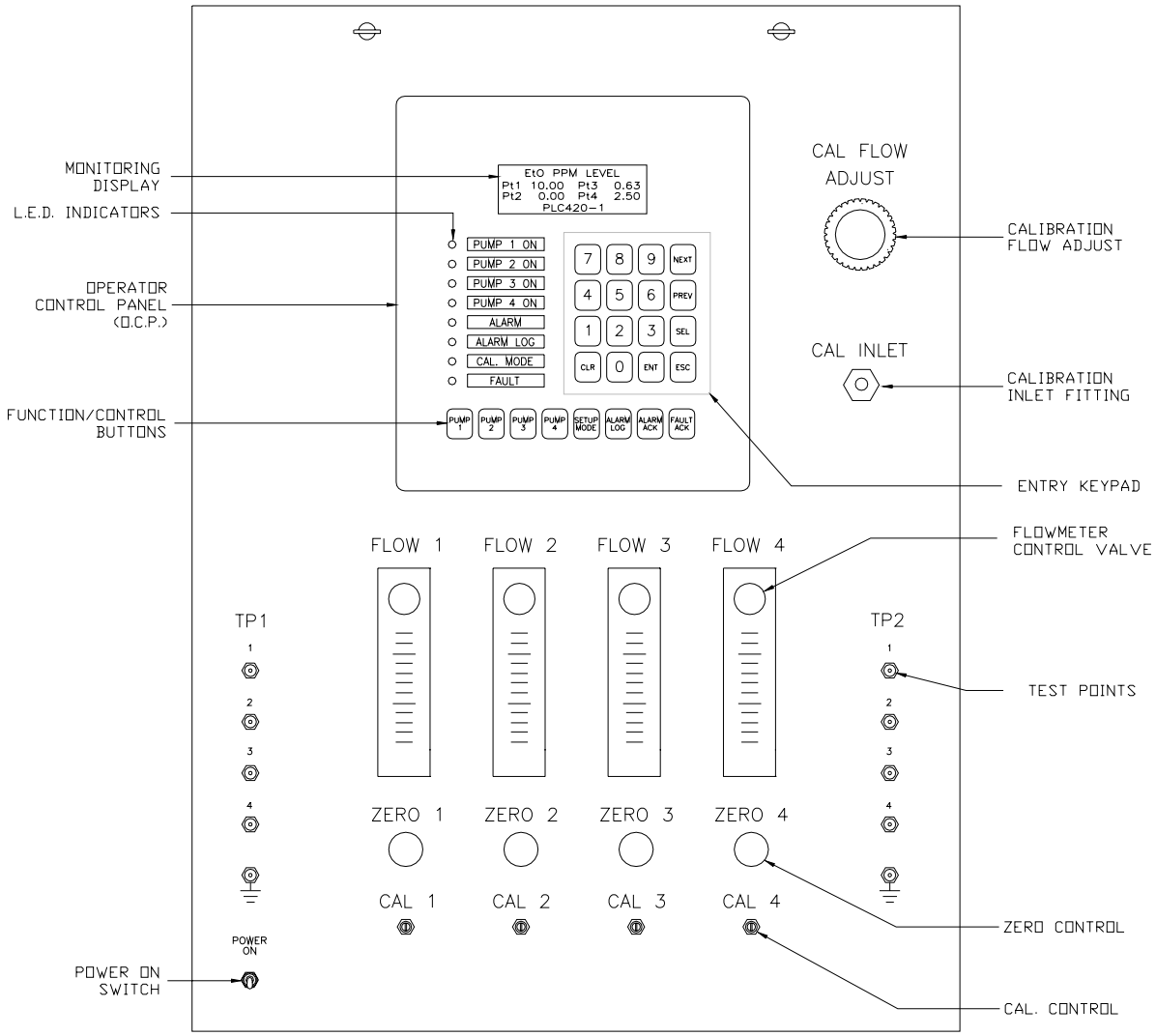

FIG. 3-1

3.1 Front Panel Controls and Indicators

3.1.1 POWER ON SWITCH

Toggle switch located in the lower left corner of the front panel. Switches AC power to the system in the up position.

3.1.2 MONITORING DISPLAY

Display window located at the top of the Operator Control Panel or O.C.P. This display allows the user to monitor the following:

- Gas concentrations in ppm (see section 4.1).
- Low and high alarm setpoints (see sections 4.1.2, 4.4)
- ALARM LOG alarm event and time tracking (see section 4.2.3)
- Calibration gas settings (see section 4.6)
- Last calibration time tracking (see section 4.6)
- Fault Conditions (see section 4.7)

3.1.3 PUMP BUTTONS 1-4

These function keys control the power to the pumps for each sample point as labeled. Pressing the button once turns the designated pump on, pressing it again turns the pump off.

3.1.4 FLOWMETERS

Labeled FLOW 1 through FLOW 4 on the front panel. The Flowmeters control the rate of sample through the sensors. They are capable of regulating flow rates between 0 and 1 liter per minute (lpm). Steady flow rate is important for accurate sensor performance and should be checked from time to time. The recommended flow rate for ETO is **0.50 lpm (or 500 sccm where alternate flowmeters are used)**. Control of the flow rate is achieved by adjusting the black flow control knob at the top of the flowmeter.

3.1.5 CAL FLOW ADJUST VALVE

Large knob to the right of the operator control panel. The calibration inlet line is not restricted by large lengths of sample tubing as are the sample inlets. The Cal Flow Adjust Valve adds an adjustable restriction to this inlet allowing the flowrate to be matched with that of the individual sample inlet lines when in Calibration mode. See section 4.6.

3.1.6 ZERO CONTROLS

Labeled ZERO 1 through ZERO 4. These controls are used to adjust the display readings during the MANUAL ZERO procedure (see section 4.5.1). They can also be used to simulate a sensor response during Electronic Calibration Service (ECS). See section 5.5.

3.1.7 CAL CONTROLS

Labeled CAL 1 through CAL 4. These are screwdriver adjustment potentiometers just below the ZERO controls. They are used to adjust the display reading to the proper value during the CALIBRATION procedure. See section 5 for details on calibration procedures.

Unless you are performing instrument calibration, THE CAL CONTROLS SHOULD NOT BE CHANGED as doing so will affect sensor accuracy!

3.1.8 ALARM TOWER LIGHTS

The Alarm Tower Lights are housed in the 3-stage light assembly provided for external alarm and fault indication. The light designations are as follows:

BLUE LIGHT - Flashes when any point is in a LO ALARM condition.
RED LIGHT - Flashes when any point is in a HI ALARM condition.
AMBER LIGHT - Flashes when any fault condition occurs (see section 4.7).

See section 2.3.2 for Alarm Tower Light installation details.

3.1.9 PIEZOELECTRIC AUDIBLE ALARM

The Piezoelectric Audible Alarm is a small constant tone horn located on the top left side of the unit enclosure. It is set to sound on any HIGH ALARM condition. The Horn can be silenced any time it is sounding by pressing the **ALARM ACK.** button on the O.C.P. Once acknowledged and silenced, the horn will remain off until the next HIGH ALARM condition occurs.

3.2 Initial Start-up

Once all installation has been completed, the system is ready for power-up. Turn power on by switching the **POWER ON** switch to the up position. After a few seconds, you will hear a continuous tone that signals the operator control unit is going through its power up diagnostics. This is normal. The main display will then light up and show the main monitoring screen shown below (values shown are examples):

```
      EtO PPM LEVEL
Pt1  0.00  Pt4  1.50
Pt2 10.00  Pt5  2.00
      PLC420-1
```

At this point, there might be active alarms and/or highly irregular readings on the monitoring display. This is also normal and is part of the sensor stabilization after prolonged periods without power.

Any time the system has been powered down or the sensors have been disconnected (off bias) for 24 hours or more, **it is recommended that the sensors be allowed to stabilize for a minimum of 12 hours upon re-applying power or re-connecting sensors before resuming or beginning sampling.** During this initial power up, do not be concerned with the status of alarm conditions. The piezoelectric horn can be silenced by pressing the button labeled **ALARM ACK** on the lower section of the operator control panel. Once the sensors have stabilized, press **FAULT ACK.** and clear any fault messages that may be present. See section 4.7 for more on fault indications.

3.3 Zeroing The Instrument

All *Interscan* sensors exhibit a slight amount of output even when not exposed to gas or when they are exposed to true "zero" air (a sample free of any sensor reactive gases). This output (called background current) can also fluctuate due to changes in temperature and sensor aging. If not compensated for, the background current would result in positive or negative display readings even though no gas was present. To compensate for this phenomenon, the unit should be "zeroed" before use for a true "zero" display reading. The ZERO procedure entails drawing sample air through a scrubbing device or filter that eliminates all reactants that the sensor could respond to and adjusting the ZERO control for a true zero reading on the PPM display.

After the initial start-up 12 hour sensor stabilization period, each sample point should be zeroed. Refer to section 4.5 for details on this procedure.

3.4 Sampling

To begin sampling, merely turn the pumps on by pressing the **PUMP** function/control buttons on lower row of buttons on the OCP and adjusting the flowmeter control valves for a flow rate of **0.50 lpm (or 500 sccm on where alternate flowmeters are used).**

3.5 Interference Gases

Interference gases are gases that can cause a false response in the sensor. In most applications, interfering gases are not an issue but if you experience frequent sensor response readings on the monitor and can confirm no EtO presence, interference gas(es) may be present.

One of the most common and troublesome interference gas sources is Isopropyl Alcohol (IPA). IPA, extensively used in areas where EtO is monitored, is a **MAJOR** interference to the EtO monitor. Frequent exposure to IPA results in sensor contamination, indicated by a permanent zero up-shift in the sensor readings, extremely slow sensor response & recovery, and/or very low PPM readings. No satisfactory scrubber for IPA is yet available. If IPA must be used in an area being monitored, shut OFF the instrument's sample pump before using IPA. Leave the pump off for 15 to 20 minutes after using IPA. Switch the sample pump back ON to resume monitoring.

Contact the INTERSCAN Service Dept. for assistance if you suspect an interference gas problem.

Section

4

Advanced System Functions

4.1 Operator Control Panel Display

The main display of the Operator Control Panel allows the user to monitor the following:

- Gas concentrations in ppm .
- Low and high alarm set points.
- Calibration gas settings.
- Last calibration time tracking.
- Fault Condidtions
- Alarm event and time tracking.

4.1.1 MAIN MONITORING SCREEN

The main monitoring screen is the first screen shown on the display upon powering up the system. It shows the gas concentrations for the 4 sample points as shown below (values shown are examples).

EtO PPM LEVEL

Pt1 0.0 Pt4 1.5

Pt2 10.0 Pt5 2.0

PLC420-1

4.1.2 SECONDARY MONITORING SCREEN

The *secondary monitoring screens* can be accessed from the main screen by pressing the **NEXT** key on the data entry keypad. Pressing this button repeatedly will cycle the display through each of the 4 dedicated sample point screens that include the gas concentration in ppm and the two current alarm set points for the sample point being viewed.

A typical *secondary monitoring screen* is shown below (values shown are examples):

SAMPLE POINT #1
ETO LEVEL 2.5 ppm
LO ALARM 1.0 ppm
HI ALARM 5.0 ppm

Pressing **ESC** will always take you back to the main monitoring screen.

4.2 Operator Control Panel Controls

The buttons on the Operator Control Panel allow the user to control the following:

- Sample pump on/off.
- Low and high alarm set point values.
- Calibration procedures.
- Acknowledging and resetting of all fault indications
- Acknowledging of all audible alarm events.
- Resetting of Alarm Log history data

The O.C.P. controls are shown in Figure 3-1 at the beginning of section 3. This section describes in detail the function of these controls.

Whenever an O.C.P. button is pressed, there will be a short beep tone to indicate the processor has received the command. If two rapid beep tones are heard, it means the processor is still executing a previous command and didn't receive the most recent one. Wait a second or two and try again. Be aware that due to the nature of the communications between the PLC and the OCP, there will be a slight delay form the moment of actuating a control to the time the given function is carried out.

4.2.1 PUMP BUTTONS 1-4

These function keys control the power to the pumps for each sample point as labeled. Pressing the key once turns the designated pump on. Pressing it again turns the pump off.

4.2.2 SETUP MODE

This button takes you to the MODE SELECT screen shown below:

(1) MANUAL ZERO MODE
(2) CALIBRATION MODE
(3) LO ALARM SETUP
(4) HI ALARM SETUP

Pressing the number on the numeric keypad corresponding to the desired mode followed by the **ENT** key will take you to the programming screen(s) for that mode. MANUAL ZERO mode (See section 4.5) is the mode used to perform manual zero procedures. CALIBRATION mode (See section 4.6) is the mode used to perform the sensor calibration procedures. LOW & HIGH ALARM SETUP (See section 4.4) are the modes used to program the alarm set point values for both the low and high alarm levels for each sample point.

4.2.3 ALARM LOG

The ALARM LOG allows the user to view the number of alarm events that have occurred over a period of time. The start of the time period is determined by the last time the ALARM LOG was reset. This feature is useful in the event that alarm conditions have occurred when no one was present to observe them.

To view the ALARM LOG, press the function/control button on the OCP labeled **ALARM LOG**. Pressing this key will bring up the ALARM LOG display screen shown below (values shown are examples):

SAMPLE POINT #1
4 LOW ALARM EVENTS
0 DAY 4 HR 13 MIN
ALARM ACK TO RESET

This particular screen indicates the number of point #1 low alarm conditions that have occurred in the time since the last resetting of the timer, in this case 4 LOW ALARM events in the last 4 hours and 13 minutes.

By pressing the **NEXT** or **PREV** keys, the operator can scroll through and view the quantities of all low and high alarms for all sample points since the last acknowledgement. **ESC** will always take you back to the main monitoring message. Pressing the **ALARM ACK**. key will reset the events counter and elapsed time to **0** for that given sample point and alarm level.

The alarm tracking screens each track up to 1000 events, for up to 1 year, beyond which the counter and timer will automatically reset to **0**. This alarm tracking feature is not a full data acquisition system, and does not tell you independent times and concentration levels. If that capability is needed, feel free to contact Interscan about its Arc-Max Data Acquisition package.

4.2.4 ALARM ACK.

This function key allows you to silence (acknowledge) the piezoelectric audible alarm when it is sounding. The audible alarm sounds when a high alarm condition exists at any sample point. Pressing **ALARM ACK**. when the audible alarm is sounding will silence the alarm until a new high alarm condition occurs. The **ALARM ACK.** control will not affect visual alarm indicators.

ALARM ACK. is also used to reset alarm tracking messages in the ALARM LOG display (see section 4.2.3).

4.2.5 FAULT ACK.

This function key allows the operator to acknowledge and display any fault conditions present in the system. When the AMBER TOWER LIGHT is flashing, pressing the **FAULT ACK.** button will bring up a fault screen that describes the fault condition and instructs the user on the proper procedure to correct the fault. See section 4.7 for more on fault conditions.

4.2.6 NUMERIC KEYPAD

The numeric keypad on the right side of the O.C.P allows the user to enter numeric values in the various setup modes, as well as navigate through the pages and finalize procedures within the setup modes. The individual functions of these buttons are described in the descriptions of the setup modes and procedures.

4.3 Operator Control Panel Indicators

The O.C.P. indicators are the column of red L.E.D.s along the left edge of the O.C.P. They indicate the status of certain functions as described below. NOTE – Under some conditions, these L.E.D. indicators are programmed to flash. Due to the nature of the PLC/OCP communications, this flashing can be relatively slow. If uncertain about the status of a particular indicator, allow at least 30 seconds to confirm “solid” or “flashing” status.

4.3.1 PUMP ON 1-4

These indicators will be lit whenever their respective pump is turned on.

4.3.2 ALARM

This indicator lights or flashes whenever there is an alarm condition present at one or more of the sample inlets. It will light solidly when any LOW ALARM level has been exceeded and will flash whenever any HIGH ALARM level has been exceeded. You can determine which specific sample point is in alarm by viewing the secondary monitoring screens for each point and comparing the alarm set point values to the current PPM level displayed (see section 4.1.2).

4.3.3 ALARM LOG

This indicator will flash whenever there is data in the alarm history log. This is an indication that alarm conditions have occurred since the last resetting of alarm history data. This L.E.D. will light *continuously* for logged LO ALARM conditions and *flash* for logged HI ALARM conditions. See section 4.2.3 for more on the ALARM LOG feature.

4.3.4 CAL. MODE

This indicator lights when the system is in the calibration mode described in section 4.6. When in a CAL MODE, normal sampling is disabled for that point until exiting the CAL MODE. This indicator is provided primarily as a reminder of the system status to prevent against inadvertently leaving the system in a non-operational mode.

4.35 FAULT

This indicator will flash in conjunction with the AMBER TOWER LIGHT whenever there is an un-cleared fault condition present. See section 4.7 for more on FAULT CONDITIONS.

4.4 Programming Alarm Setpoints

4.4.1 LO ALARM SETUP

The **LO ALARM** set points are factory set at **1.0 ppm**. To change any of these set points, you must enter the LO ALARM SETUP MODE by pressing the function/control button on the OCP labeled **SETUP MODE**. Pressing this key will bring up the MODE SELECT display screen shown below:.

(1) MANUAL ZERO
(2) CALIBRATION
(3) LO ALARM SETUP
(4) HI ALARM SETUP

Press **3** for LO ALARM SETUP followed by the **ENT** key. This will take you to the HIGH ALARM SET POINT ENTRY screen shown below (values shown are examples):

SAMPLE POINT #1
LOW ALARM LEVEL 1.1
NEW ENTRY __.__
(NEXT/PREV)LOW ALARM

By pressing the **NEXT** or **PREV** keys to the right of the numerical keypad, you can scroll through the set screens for all 4 sample points. ESC will always take you back to the main monitoring message.

Once you are on the screen for the sample point alarm that you want to change, simply enter in the desired value by pressing 0 – 500 at the entry keypad, (ex. a value of 17.5 would be entered as “175”). Once satisfied with the new low alarm set point entry, press the green **ENT** key. If the value entered is above 500 (50.0), an error message will briefly display *MAX ENTRY 500*. If during

numeric entry you depress a wrong number, simply press the green CLR key to clear the incorrect entry. **All Low Alarm conditions will activate after a two second delay.**

Press **NEXT** or **PREV** to move to the next sample point alarm set screen. When finished, press **ESC** to return to the main monitoring screen.

4.4.2 HI ALARM SETUP

The **HI ALARM** set points are factory set at **5.0 ppm** . To change any of these set points, you must enter the HI ALARM SETUP MODE by pressing the function/control button on the OCP labeled **SETUP MODE**. Pressing this key will bring up the MODE SELECT display screen shown below:

(1) MANUAL ZERO
(2) CALIBRATION
(3) LO ALARM SETUP
(4) HI ALARM SETUP

Press **4** for HI ALARM SETUP mode followed by the **ENT** key. This will take you to the HIGH ALARM SET POINT ENTRY screen shown below (values shown are examples):

SAMPLE POINT #1
HIGH ALARM LEVEL 2.2
NEW ENTRY __.__
(NEXT/PREV)HIGH ALARM

By pressing the **NEXT** or **PREV** keys to the right of the numerical keypad, you can scroll through the set screens for all 4 sample points. ESC will always take you back to the main monitoring message.

Once you are on the screen for the sample point alarm that you want to change, simply enter in the desired value by pressing 0 – 500 at the entry keypad, (ex. a value of 17.5 would be entered as “175”). Once satisfied with the new high alarm set point entry, press the green **ENT** key. If the value entered is above 500 (50.0), an error message will briefly display *MAX ENTRY 500.* If during numeric entry you depress a wrong number, simply press the green CLR key to clear the incorrect entry. **All High Alarm conditions will activate after a two second delay.**

4.5 Sensor Zero Mode

Zeroing of the sample point displays is necessary from time to time to compensate for natural zero drift of the sensor output due to temperature fluctuations and sensor aging. The procedures for zeroing the system are described below.

4.5.1 MANUAL ZERO PROCEDURE

Press the function/control button on the OCP labeled **SETUP MODE**. Pressing this key will bring up the MODE SELECT display screen shown below.

(1) MANUAL ZERO
(2) CALIBRATION
(3) LO ALARM SETUP
(4) HI ALARM SETUP

Press **1** for MANUAL ZERO mode followed by the **ENT** key. This will bring up the SAMPLE POINT SELECT display screen shown below:

ENTER
SAMPLE POINT NUMBER
FOR ZEROING
(_)

Enter the number for the sample point to be zeroed on the numeric keypad and press the **ENT** key. This will automatically turn on the pump for that sample point (if not already on) and actuate the solenoid valve that will direct the sample flow for the sample point being zeroed through the ZERO AIR inlet and charcoal filter on the right side of the enclosure. The ZERO MODE screen will now be displayed (values shown are examples):

ZEROING POINT #1
ADJUST ZERO CONTROL
EtO LEVEL ___._ppm
PREV/ESC WHEN DONE

This screen shows the point being zeroed, the current display reading and what to do when finished zeroing.

Now adjust the flow meter control valve for the associated sample point to the recommended flow rate of **0.50 liter/minute**. Allow several minutes for the reading to stabilize prior to making **ZERO** adjustments. Once the reading is stabilized, manually adjust the **ZERO** potentiometer knob for the associated point until the **ppm** value reads **0.00** .

Pressing the **PREV** key will take you back to the SAMPLE POINT SELECT screen where you can initiate zeroing on another sample point. Pressing **ESC** will take you back to the main monitoring screen.

4.6 Calibration Mode

As the *Interscan* sensor ages, it's output will gradually decay causing a drop in display readings for a given ppm value of gas present. Sensor calibration is used to adjust the system display to compensate for sensor decay. This is accomplished in CALIBRATION MODE by introducing a known concentration of gas via the CAL inlet, allowing the sensor to respond to the gas and adjusting the **CAL** control for the associated sample point to match the value of the cal gas used on the ppm display. See section 5 for details on calibration gas standards, calibration gas delivery options and full calibration procedure.

To enter the calibration mode, press the function/control button on the OCP labeled **SETUP MODE**. Pressing this key will bring up the MODE SELECT display screen shown below:

(1) MANUAL ZERO
(2) CALIBRATION
(3) LO ALARM SETUP
(4) HI ALARM SETUP

Press **2** for CALIBRATION mode followed by the **ENT** key. This will bring up the CALIBRATION SAMPLE POINT SELECT display screen shown below:

ENTER
SAMPLE POINT NUMBER
FOR CALIBRATION
(_)

Type in the number for the sample point to be calibrated on the numeric keypad and press the **ENT** key. You will then be taken to the LAST CALIBRATION screen which shows the time elapsed since the last finalized calibration. This screen is shown below (values shown are examples):

#1 LAST CALIBRATION
30 DAYS 6 HOURS
35 MINUTES 12 SECONDS
SELET NEXT OR PREV

This screen is provided as a tool to keep track of calibration frequency. Pressing **PREV** will take you back to the CALIBRATION SAMPLE POINT SELECT screen where you can enter a new sample point value and view its LAST CALIBRATION screen. Pressing **NEXT** will continue the calibration procedure for the point selected and take you to the CALIBRATION GAS VALUE entry screen shown below (values shown are examples):

SAMPLE POINT #1
ENTER CALIBRATE GAS
10.0 VALUE __._
SELECT NEXT OR PREV

The top line shows the sample point you will be calibrating. The third line shows the ppm value of the calibration gas used in the last calibration. If the value of the current calibration gas is different, enter it on the entry line by typing in 0 - 500, (displayed as (0.0 – 50.0). Once satisfied with the new calibration gas entry, press the **ENT** key. If the value entered is above 500 (50.0), an error message will briefly display *MAX ENTRY 500*. If during numeric entry you depress a wrong number, simply press the **CLR** key to clear the incorrect entry.

Pressing **NEXT** will turn on the pump for the selected sample point (if not already turned on) and divert it's sample flow to the CAL inlet while bringing up the CALIBRATION screen shown below (values shown are examples):

INTRODUCE CAL GAS
CAL GAS = 10.0 ppm
Pt1 LEVEL 2.0 ppm
SELECT=DONE OR PREV/ESC

This screen allows the user to compare the live sensor concentration with the pre-selected calibration gas value. The entry of the calibration gas value does not affect the calibration procedure and is not required to proceed with calibration but is recommended for reference purposes while in the calibration screen.

At this point, calibration gas would be introduced at the CAL inlet and live display values adjusted according to the calibration procedures detailed in section 5. **Please read section 5 before attempting to calibrate the system.**

Being in the calibration mode interlocks (locks out) the alarms for that sample point. Due to this, it is recommend that the calibration gas be removed, and the sensor be given time to stabilize back to a zero reading prior to exiting the calibration mode. This way no false alarms will register due to decaying sensor response.

Once calibration is completed, finalize the procedure by pressing the **SEL** key which will reset the elapsed time since last calibration, and return the display to the CALIBRATION SAMPLE POINT SELECT screen. Pressing **PREV** will return you to the calibration gas select message. Pressing **ESC** will return the display to the master monitoring message without resetting the elapsed time since last calibration.

4.7 Fault Conditions

A FAULT condition is an indication that some part of the system has encountered a problem that may require some maintenance or repair. A FAULT condition is indicated by the flashing AMBER TOWER LIGHT.

When a FAULT condition occurs, pressing the **FAULT ACK.** button will bring up a display screen that describes the nature of the fault and corrective measures required to remedy the fault condition. After remedying the fault condition, pressing **FAULT ACK.** again will turn off the AMBER TOWER light and clear the fault display screen returning it to the main monitoring screen. IF A FAULT INDICATION CANNOT BE RESET BY PRESSING **FAULT ACK.,** THE FAULT CONDITION STILL EXISTS AND SHOULD BE INVESTIGATED FURTHER. Contact the *Interscan* service dept. if you have any trouble with resetting fault conditions.

If multiple fault conditions occur at any given time, only one will be displayed at a time on the OCP. When the first of a series of faults is cleared the next in line will then be displayed on the OCP until all faults have been acknowledged, their conditions eliminated and the fault messages cleared. If

at any time during acknowledgement of a fault condition you wish to return to the main monitoring screen you can do so by pressing **ESC.**

4.7.1 LOW FLOW (VACUUM) FAULTS

The LO FLOW Vacuum Fault indication is provided to alert the user to a drop in flow rate which can cause decreased sensor accuracy. This is typically the result of a clogged inlet filter but can also be caused by kinks in the sample tubing, an improperly adjusted vacuum switch or a damaged sensor.

A LO FLOW Vacuum Fault will be triggered whenever a sample line blockage causes the flowrate to drop **1-1.5 lpm** below the recommended rate of **0.50 lpm.** Pressing **FAULT ACK.** following a LO FLOW Vacuum Fault will cause the following message to be displayed (sample point 2 example) :

SAMPLE POINT #2
VACUUM FAILURE !
CHECK INLET FILTER
PRESS FAULT ACK.

At this point the inlet filter for the indicated sample point should be checked and replaced if noticeably dirty or clogged. Upon changing the filter, press **FAULT ACK.** to reset the fault indication and return to the main monitoring screen. If after changing/checking the inlet filter the fault message will not reset by pressing **FAULT ACK.,** check all sample tubing for kinks. If the tubing is O.K., the vacuum switch for that point could be out of adjustment. Contact the Interscan service dept. for assistance in confirming and/or adjusting vacuum switch settings. (See note below)

4.7.2 PUMP SHUTOFF FAULTS

To protect the sensor from exposure high concentrations of EtO, the pump will automatically shut off when the the EtO level for a given point exceeds **60.0 ppm**. The PUMP SHUTOFF FAULT indication is provided merely as a warning that this condition has occurred. No action is required other than acknowledging and resetting the fault.

When a PUMP SHOTOFF FAULT occurs, pressing FAULT ACK. will bring up the following display screen at the OCP (values shown are examples):

SAMPLE POINT #3
PUMP SHUTOFF FAULT
EXCESSIVE EtO LEVEL
PRESS FAULT ACK.

Pressing FAULT ACK. again will reset the fault unless the high concentration condition still exists in which case the cause of the high EtO exposure should be investigated and attended to. Frequent PUMP SHUTOFF FAULTS can be a sign of the presence of interference gases or a problem with the system. Consult the Interscan Service Dept. for assistance if this occurs.

Following a pump shutoff condition, the sensor's output and ppm display will slowly decay below the **60.0 ppm** shutoff level. The pump will automatically restart when the sensor output decays below **50.0** ppm. This may result in a continuous cycle of pump on/off switching until the source of high EtO concentration is eliminated.

NOTE: Anytime the system is without power for any significant period of time, powering back up can result in PUMP SHUTOFF faults caused by temporarily high sensor outputs during stabilization. Wait until the sensors stabilize then clear the faults.

4.7.3 LO BATTERY FAULT

This PLC-420 monitoring system is controlled by a Koyo DL240 Programmable Controller. The volatile memory in the PLC (alarm set points, alarm history etc.) is backed up by a battery in the case of power failure. Normal life expectancy of the CPU battery is up to five years.

When the battery voltage drops below a certain level, a fault indication will occur.. Acknowledging a Low Battery Fault will result in the the following screen being displayed:

KOYO DL240 CPU
LOW BATTERY FAULT !
BATTERY VOLTAGE 0.1
REPLACE IMMEDIATELY

This message will not clear until the battery is replaced. Upon fault notification of a low battery condition, the operator should immediately obtain a replacement battery, and install it in the PLC CPU. The Koyo DL240 battery part # is **D2-BAT**. Contact the Interscan Service Dept to order this part.

Replacement procedure of the CPU battery is as follows:

1. Obtain new **D2-BAT** for replacement.
2. Turn Power On switch off so the PLC has no power to it.
3. Remove phone jack connector from CPU noting the terminal # for re-connection later.
4. Pull two snap tabs on top & bottom of CPU towards front of system.
5. Grip CPU at top & bottom of module and retract from I/O base.
6. Unplug old battery connector from CPU module, and remove battery from clamp.
7. Gently push the new battery into the holding clamp, and re-connect plug connector.
8. Reinstall CPU to I/O base pushing firmly at top & bottom of CPU.
9. Push two snap clips into CPU so they are flush with CPU module.
10. Plug phone jack connector back into CPU port noted in step 3.
11. Turn power on.
12. If the battery was properly installed, the Lo Battery fault indication will reset automatically on power-up. (There may be pump shutoff fault conditions present on power-up due to sensor output during stabilization.)
13. Verify all alarm setpoints are still valid, as they should be. Only if the battery was not replaced soon enough, will variable values such as alarm setpoints be lost. If the setpoints were lost, reprogram them as described in section 4.4.

The basic system functions will still operate normally under a low battery condition as long as AC power to the system remains intact.

4.7.4 24 VDC POWER SUPPLY FAULT

This fault will occur if there is a failure in the 24 VDC power supply or if it's fuse is blown (F2). When a 24 VDC power supply fault occurs, pressing **FAULT ACK**, will result in the following message will being displayed:

24VDC
POWER SUPPLY FAILURE
CHECK SUPPLY & F2

PRESS FAULT ACK.

Turn power to the unit off and check F2. If blown, change the fuse (AGC-1A), turn unit back on. If the fault condition has been removed, the fault indication will automatically reset on power up. (There may be pump shutoff fault conditions present on power-up due to sensor output during stabilization). If the 24 VDC Power Supply fault does not reset and the problem persists, contact the Interscan Service Dept.

5

Sensor Calibration

5.1 Introduction

All *Interscan* instruments are calibrated at the Factory prior to shipment. Unless the CAL. adjustment knob is inadvertently changed, there is no need to calibrate the monitor until it has seen considerable usage

There is no easy answer as to how often zeroing and calibration should be performed. This is strictly a function of the application. Sensor zeroing compensates for signal drift and sensor calibration compensates for any possible decrease in sensitivity. The primary cause of sensitivity decrease is excessive loss of water by evaporation due to time and temperature.

The instrument is calibrated by introducing a known concentration of gas and adjusting the CAL. control to the proper ppm level while in the CAL.MODE on the OCP. As such, the analysis of the calibration gas must be accurate. The sources of gas standards include commercially available gas mixtures diluted with air or nitrogen in cylinders or permeation devices.

Interscan offers “Electronic Calibration Service” (ECS – See section 5.5), which permits the user to calibrate the instrument without the use of gas. Calibration is accomplished by quick and simple adjustments of the ZERO and CAL. controls using a digital voltmeter.

5.2 Calibration Gas Standards

5.2.1 GAS BLENDS IN CYLINDERS

Low concentration gas mixtures (in air or nitrogen) are available with few exceptions, in pressurized cylinders. The major concern in using commercially available mixes of such active
gases as EtO, is reliability. The analysis results shown on the label are applicable only at the time the analysis was performed. Concentration stability with time varies widely as a function of the gas mix, its container, and the manufacturer. *Interscan* should be consulted for recommendations on commercially available gas mixtures.

5.2.1 PERMEATION DEVICES

An alternative calibration method is the use of permeation devices containing the gas liquefied under pressure. Permeation of the gas in nanogram-per-minute rates, permits the generation of a desired concentration in an air or nitrogen carrier.

Varying the temperature, flow rate, and emission rate characteristics gives a fairly wide range of gas concentrations. Many gases in a low ppm range, including ETO, are ideally suited to the permeation device technique. It is important to remember to keep the permeation device flow rate higher than the **0.50 liter/minute** rate required by the *Interscan* ETO system.

Consult the permeation device manufacturer for complete operation and procedure information.

5.3 Sample Bag

Whatever the source of calibration standard, the recommended method of gas collection and delivery is via a proper sample bag, which is then attached to the calibration inlet. The calibration gas is drawn through the sensor by the sample pump.

Contact *Interscan* for recommendations on the type of sample bag to use.

5.4 Calibration Procedure

Calibration can be performed by either introducing cal gas sample at the CAL INLET on the front panel (CAL MODE) one sample point at a time OR by introducing cal gas at the sample inlet stations (SAMPLE MODE) in a simultaneous fashion. The latter method will require multiple gas delivery apparatus where the former can be done with a single gas delivery source but will require multiple cycles. Calibration via CAL MODE can be done all from one place but requires more steps and can only be done one point at a time where calibration in SAMPLE MODE can be done on all points simultaneously if properly equipped but will require gas introduction away from the monitor's control panel. The choice will depend on how you are equipped for gas delivery and which method you find more convenient.

5.4.1 CAL MODE CALIBRATION

1. Perform the MANUAL ZERO procedure as detailed in section 4.5.1.

2. Press the **SETUP MODE** button on the OCP.

3. Press **2** on the numeric keypad for CALIBRATION MODE then press the **ENT** button.

4. Enter the number of the sample point you wish to calibrate by typing in the number on the numeric keypad and pressing the **ENT** button.

5. Observe the time since the last calibration and note as desired for maintenance records. Press the **NEXT** button to continue.

6. Enter the ppm value of the calibration gas to be used for the current calibration by typing the value in on the numeric keypad and then pressing the **ENT** button. EX: **12.3 ppm** would be entered as 123 followed by **ENT**. Press **NEXT** to continue.

7. Adjust the CAL FLOW ADJUST control for a flow rate of **0.50 liter.minute** on the appropriate flowmeter.

9. Fill the sample bag with the calibration standard, and attach it to the CAL INLET bulkhead fitting. This is best done by attaching a short length 2 inches (50 mm) of 1/4 inch (6.350 mm) OD flexible tubing to the sample bag nipple, then pushing the tubing firmly into the CAL INLET fitting then pulling back on the tubing to ensure a snug connection.

10. After a 8 - 9 minute delay, adjust the CAL. potentiometer so that the Greyline OCP shows the same live sensor concentration as the CAL. GAS value entered in step 6.

11. Press in on the grey collar of the CAL INLET fitting while pulling back on the tubing and remove the sample bag. Allow time for the sensor output to return to zero.

12. Press the **SEL** key on the O.C.P. This will reset the elapsed time since last calibration and return you to the SAMPLE POINT SELECT screen.

13. Return to step 4 and repeat this procedure for the remaining sample points. When finished with all sample points, press the **ESC** button to return to the main monitoring screen.

5.4.2 SAMPLE MODE CALIBRATION

1. Perform the MANUAL ZERO procedure as detailed in section 4.5.1.

8. Turn the pump(s) on for the points to be calibrated and adjust the FLOWMETER control(s) for a flow rate of **0.50 liter/minute** on the appropriate flowmeter(s).

3. Fill the sample bag(s) with the calibration standard, and attach to the inlet port of the inlet sample station filter for the point(s) to be calibrated.

4. After a 8 - 9 minute delay*, adjust the CAL. potentiometer so that the display value for the appropriate sample point on the display shows the same live sensor concentration as the CAL. GAS value.

* Time based on a sample distance of 50 ft. Add 15 seconds for every additional 50 feet of sample tubing in the line.

5. Remove the cal gas source from the sample inlet and allow display readings to return to **0.0 ppm.**

NOTE: When using this calibration method, the LAST TIME CLIBRATRED TIMER and indicator in the CAL MODE displays on the OPC will not be reset and will give erroneous readings the next time CAL MODE is used. This will in no way affect calibration accuracy.

5.5 Electronic Calibration Service (ECS)

The factory recommended procedure for calibrating all *Interscan Corp*. sensors involves the use of calibration gas or permeation device. Besides being essential for calibration, having a known certified gas standard on hand allows the user to test the instrument at any time to verify that the sensors “really work”.

There will be times and circumstances in which calibration using calibration gas or permeation devices is inconvenient and/or impractical. For this reason Interscan Corp. developed the **E**lectronic **C**alibration **S**ervice (ECS).

A certified spare sensor is kept on hand as a replacement, to be installed in the system while the presently used sensor is sent back to the factory for certification. The ECS certification details zero

and calibration adjustments that are to be made to the system, to set it up with the specified newly certified sensor.

The ECS program verifies the integrity of the sensor sensitivity only, and does not guarantee the operation of the entire system. Most importantly, the ECS program is not a substitute for basic system maintenance, nor does it check for malfunction of system components.

Maintenance

6.1 Inlet Particulate Filter

The Millipore inlet particulate filters housed in the sample point stations are provided to keep particulate matter from entering the sensors and pneumatics. These filters need to be inspected and changed on a regular basis with frequency depending on the nature of the environment in which the system operates. The filter condition is continuously monitored via vacuum switches for each sensor. If a flow restriction causing the flow rate to drop **1-1.5 lpm** below the recommended **0.50 lpm** occurs, a FAULT indication will result. Smaller drops in flow rate below the nominal **0.50 lpm (or 500 sccm on where alternate flowmeters are used)** rate won't cause FAULT indications but still may indicate a clogged filter. The flow rate should be checked from time to time to ensure that it is maintained at the nominal rate. The filter should be changed if frequent upward adjustment is necessary to keep the flow rate at or above **0.50 lpm**. Periodic replacement on a field-determined time interval (for your particular installation) is the best approach. If regular maintenance checks reveal heavily packed or clogged filters, more frequent inspection is indicated.

To change the filter element, unscrew the outer section of the round filter housing attached to the sample point station revealing the filter element disc. If the disc is noticeably dirty or clogged, replace it with a new one. It is also a good idea to inspect the inside of the inlet port and clean as necessary. Insert the new filter element with the shiny side facing in toward the fixed part of the housing. Carefully screw the outer housing back on to the inner housing making sure the element stay flush against the inner housing surface.

6.2 Sensor Maintenance

Sensors in continuous monitoring systems under continuous operation lose water by evaporation. Optimum performance requires that this water be replaced periodically. This is done by injecting **distilled** or **deionized** water into the sensor via the red fill plug hole, using the plastic 10 ml syringe provided.

6.2.1 SENSOR WEIGHT

The amount of water needed for normal operation of the sensor is not critical for most sensors, but is not advisable to exceed a maximum weight loss of more than 25 grams, or a weight gain of more than 10 grams. It is recommended that the sensor be weighed every 6 weeks. The sensor can be weighed be removing the sensor from the system and comparing the current weight of the sensor, with its original weight (in grams) shown on the label on underside of the sensor base.

6.2.2 SENSOR REMOVAL

To remove the sensor, turn power to the unit off and disconnect the electrical connections to the sensor (1 blue wire and 1 white/blue stripe wire). Disconnect the tubing from the sensor ports by pushing in on the dark gray collar on the sensor elbow fittings while simultaneously pulling out on the tubing. Unscrew the 2 screws holding the sensor base to the slide in bracket and slide the sensor away from the bracket.

For Formaldehyde and Hydrazine sensors, remove the sensor body from the sensor base by loosening the clamp screw and lifting the sensor body away from the base. **NOTE: DO NOT REMOVE ANTHING ELSE FROM THE SENSOR**

6.2.3 SENSOR REFILLING PROCEDURE

1. Restore the original sensor weight by injecting an amount of **distilled** or **deionized** water in cc's equal to the weight loss in grams via the red fill plug. (10g weight loss means add 10cc of water). **DO NOT OVERFILL !**

   If the sensor has gained weight up to 10g, no action is required. NEVER remove water from the sensor as this will remove electrolyte as well and damage the sensor. If weight gain exceeds 10g, contact the factory for instructions.

2. Re-install sensor. Assure that all electrical and pneumatic fittings are secure. The sensor should be allowed to stabilize for at least 12 hours with POWER ON.

Section

7

Troubleshooting

A high percentage of service problems often result from little things you can find and fix yourself. Always consult with the INTERSCAN service department for problems not on this list or if suggested corrective actions fail to fix the problem. ALWAYS turn power off before working inside the unit.

Symptom	Corrective Action or Probable Cause
No power	• Check that power switch is on. • Turn power off and check main fuse (F1) located at the middle left side of the unit chassis. If fuse is blown, replace with AGC-2A and turn power back on. If fuse continues to blow, contact the *Interscan* Service Dept.
Can't achieve 0.50 LPM flowrate.	• Check inlet filter for blockage. • Check the pump's speed control knob on the left side of pump. This should be turned fully clockwise. • Check all tubing for kinks.
Liquid in flowmeter or tubing.	• Sensor has leaked electrolyte. Consult with Interscan service dept. for sensor, and affected component replacement.

Symptom	Corrective Action or Probable Cause
No response to gas	• Check all sensor connectors for firm connections. • Check for solid connection of circuit board connectors to circuit boards (Circuit boards are located above the sensors on inside of the lower panel support). • Check that Cal/Span control is not turned all the way down (full counter-clockwise).
Cannot Zero	• Check the Bias voltage with a DVM at TP1 on the front panel. This voltage should be within the range shown in table 7-1 below for the type of sensor being used. If not within the range shown, contact the *Interscan* service dept. • For units equipped with AUTO ZERO, make sure you are attempting to zero in the ZERO MODE on the OCP (this resets AUTO ZERO correction voltages which can affect manual zeroing). • Sensor may be bad. Contact the *Interscan* service dept.

TABLE 7-1 BIAS VOLTAGES

GAS	BIAS VOLTAGE RANGE
CO	665 - 687 mV
EtO	390 - 410 mV
HCl / HCN	480 - 500 mV
MMH / HZ	240 - 260 mV
HCHO	190 - 210 mV
SO_2	540 - 560 mV
Cl_2	-790 - -810 mV
ClO_2	-790 - -810 mV
NO_2	-790 - -810 mV
NO / NO_X	340 - 360 mV
H_2S	490 - 510 mV

Section

8

Warranty

Interscan Corporation warrants continuous monitoring systems of its manufacture (sensors, batteries, fuses, lamps, tubing, fittings, filters, and scrubbers excepted) to be free from defects in material and workmanship for a period of one year from date of shipment.

Interscan Corporation warrants sensors of its manufacture to be free from defects in material and workmanship for a period of six months from date of shipment.

Interscan Corporation's sole obligation under this warranty is limited to repairing or replacing, at its option, any item covered under this warranty, when such item is returned intact, prepaid to the factory (or designated service center).

This warranty does not apply to any of our products which have been repaired or altered by unauthorized persons, or which have been subject to misuse, negligence, or accident, incorrect wiring by others, installation or use not in accordance with instructions furnished by the manufacturer, or which have had the serial numbers altered, effaced or removed. The sensors are factory sealed and must not be opened or modified in the field for the warranty to remain in effect. This warranty is in lieu of all other warranties, whether expressed or implied.

This warranty does not apply to any of our products, that have had any program and/or software changes incurred, without written authorization from *Interscan Corporation*.

Additionally, warranty on any component shall not exceed the manufacturer's warranty given to *Interscan Corporation*.

Section

9

Return Authorization

All returns for repairs require a **"RETURN AUTHORIZATION NUMBER"** issued by the *Interscan* Service Department.

This is done primarily to cause the user to contact the factory directly. The reason for this is that a high percentage of service problems are resolved over the telephone, avoiding the need for returning the instrument or part. In other cases, the Service Department may ask for the return of the circuit board only.

Should return of the instrument or part be advised by the Service Department, the **"RETURN AUTHORIZATION NUMBER"** will expedite prompt return of the repaired unit.

For service information please contact:

Interscan Corporation

Service Department, Extension 121

(800) 458-6153 (USA & Canada)

(818) 882-2331

FAX # 818-341-0642

Section
10

Parts List (Quantities are 1ea. unless shown otherwise)

10.1 PROGRAMMABLE CONTROLLER

DL240 CPU	D2-240
CPU Battery	D2-BAT
6 Slot Base	D2-O6B
4 Pt. Analog Input	F2-04AD-2
8 Pt. 24 VDC Input	D2-08ND3
8 Pt. Relay Output	D2-08TR
12 Pt. Relay Output	D2-12TR
8 Pt. 24VDC Output	D2-08TD1

10.2 OPERATOR CONTROL PANEL

Greyline OCP	2125

10.3 SENSOR COMPONENTS

ETO Sensor (4ea.)	120-LD
Sensor Board (2ea.)	ISC-2CS1000

10.3 PNEUMATICS

Sample Pump (4ea.)	BP 202-1
Flow Meter (4ea.)	11220VOB-S Matheson
Particulate Filter (4ea.)	458-E
Zero Filter	C-12 or 125-SS-2

Vacuum Switch (4ea.)	MPL 502-26
Tubing	B5BEV-IV
Solenoid Valve (4ea.)	B14DK1075-24VDC
Cal Flow Control Valve	D3732G4Y

10.3 MISCELLANEOUS COMPONENTS

24V Power Supply	HB24-2.1-A
± 15V Power Supply	ISC1515.1
4-20 mA Xmtr Board (4ea.)	ISC 420-X
6 Pt. Relay Board (2ea.)	ISC 4154-1
24V / 5 amp Relay (8ea.)	LZ 24H
CAL. Potentiometer (4ea.)	43P103
ZERO Potentiometer (4ea.)	3540L-1-503M

Section

11

Wiring Diagrams