H_2S ANALYZER MANUAL

***Series 150-II* Analyzers**

ANALYTICAL SYSTEMS KECO

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Introduction

Detection Technology_____

The primary detection technology of **Analytical Systems** has three advantages based on the chemistry and physics involved.

"No interference"

is proven by years of experience with various applications where no other chemical reaction with lead acetate has been found to darken the sensing tape except H_2S. This ensures that only a sulfur-specific reaction will occur.

"Linear response"

indicates that the rate of tape darkening is linear with respect to the H_2S concentration. The benefit of this response is the straight forward relationship between the measured variable and quantity units. Equipment maintenance is easier and only a single point calibration is required.

"Parts per billion sensitivity"

relates to measurements that can be made even when the H_2S concentration is only one one-billionth of the total volume. This accuracy benefits the user in determining acceptable levels that can be monitored.

This detection technology is applied to a range of product applications. Mathematical formulations and field-proven results demonstrate the calculation precision that is available.

Important Fundamentals_____

It is important to note that a variety of fundamentally different implementations have been applied to lead acetate chemistry over the years. These fundamental selections of sample handling, optical coupling, signal detection, and information processing each have major impact on the system performance.

The following descriptions outline some of the parameters implemented by **Analytical Systems** to achieve superior performance and easy operation.

- Sample flow is tangent to **ASI *Tape*** to eliminate effects from porosity variations when sample is passed through the substrate
- Signal generation is based on H_2S concentration only, therefore sample volumetric flow rate does not affect accuracy
- Calibration options allow flexibility to match available resources with application requirements
- Spectral correlation of the optical path for optimum impedance matching has been designed into the system.
- Conversion resolution of the signal is more than 100 times greater than with previously available technology.
- **ASI** information processing algorithms completely eliminate the effects of parameter offsets commonly referred to as ***drift*.**
- Signal over sampling algorithms are implemented for statistical detection processing and accuracy correlation
- Full floating point precision is used to execute all information processing algorithms
- Function keys and local display provide easy operation selection and direct result display
- Diagnostic program execution and status alarms contribute to reliable on-line operation
- Plain language displays with descriptions of operation status support easy operation

Technical Support_____

ASI offers technical support, training, and service. Contact the factory or your local representative for details.

Product Improvement Policy_____

Analytical Systems equipment was designed and built to the performance requirements stated in the product specifications at the time of manufacture. It is **ASI** policy to perform continuous product improvement research that often results in modifications that improve the performance of **ASI** equipment. When such improvements are developed we may, from time to time, notify owners of **ASI** equipment and offer any available upgrades at reasonable prices.

Area Classifications_____

ASI analyzers can be configured for General Purpose use or for use in any of the following NEC area classifications (with the exception of the portable unit which is for General Purpose use only). The configuration must be determined at the time of order placement.

Class I

Locations in which flammable gases or vapors are (or may be) present in the air in quantities sufficient to produce explosive or ignitable mixtures.

Division 1
Locations in which hazardous concentrations of flammable gases or vapors exist continuously, intermittently, or periodically.

Division 2
Locations in which volatile flammable liquids or gases are handled, processed, or used, but are normally kept in closed containers and can only escape due to accidental rupture. The hazardous conditions will occur only under abnormal conditions.

Class II

Locations that are hazardous because of the presence of combustible dust.

Division 1
Locations in which explosive or ignitable amounts of combustible dust is (or may be) in suspension in the air continuously, intermittently, or periodically.

Division 2
Locations where combustible dust deposits exist but are not likely to be thrown into suspension in the air, but where dust deposits may be heavy enough to interfere with safe dissipation of heat from electrical equipment or where dust may be ignited by arcs, sparks or burning material from the equipment.

General Information

Specifications_____

Display:	Alpha Numeric LCD 128x64 Pixels	
Temperature Ranges:	0°C to 50°C (operating) 0°C to 70°C (storage)	
Analog:	Isolated 4 - 20mA	
Analytical Performance:	Resolution:	1 ppb
	Accuracy:	±2% of Scale
	Repeatability:	± 1% of Scale
	Linearity:	± 1% of Scale
	Drift:	Nil
	Temp. Coefficient:	.01%/°C
	Analysis Time:	1 Second
	Chemical Interference:	None
Area Classification:	General Purpose	
Weight:	~10 pounds	
Dimensions:	10.5”w x 12.5”h x 6.5”d	
Power Required (No Options):	110VAC, 50/60Hz .050A (5 Watts)	
	220VAC, 50/60Hz	
	12 VDC 0.2A (2.4 Watts)	
	24 VDC 0.1A (2.4 Watts)	
Digital Outputs:	14 Available	
Digital Inputs:	6 Available	
Communication:	RS232 or RS485 Modbus, ASI Ascii	

Unit Information_____

A serial number tag is located inside the tape deck panel assembly. This tag provides the following information:

Number	Power
Serial Number	Area Classification
Range	

Customer service is available by phone. You should have the above information ready when you call **ASI**. This will help technicians in giving you the assistance you need.

Supplies_____

Humidifier Solution - 5% Acetic Acid, available in quart bottles
Year Supply - approximately 8 quarts, per analyzer

ASI Tape - Lead Acetate Sensing Tape, available in 100'x1/2" rolls
Year Supply - approximately 6 rolls, per analyzer

Spare Parts_____

A spare parts listing for your analyzer can be found in section 7 of this manual.

Maintenance Schedule_____

Tape Replacement - The tape should last four weeks to three months. Replace as needed. Follow the instructions in the Maintenance section. Check the Humidifier Solution level when replacing the sensing tape.

Humidifier Solution - The humidifier solution level should always be above the tubing inside the humidifier. Follow the instructions in the Maintenance section to fill it. Simply top off the solution level for proper humidifier maintenance.

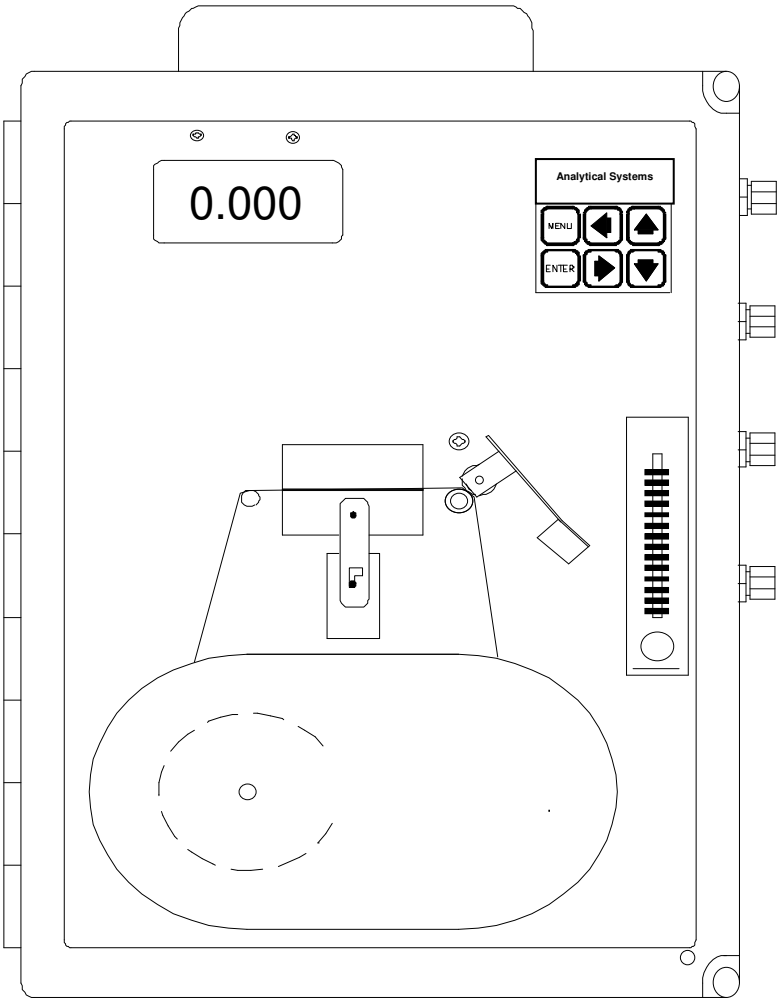
Sample Filter Element - Should be checked/cleaned once each month. (If your analyzer is equipped with the Liquids Removal Filter, check the filter membrane periodically. See the Options section of this manual for instructions on changing the membrane.)

Calibration Gas Cylinders - Check as needed for adequate supply levels.

Components

This sections identifies the components of the **ASI** analyzer. It also gives brief descriptions of the components and their functions.

The descriptions and corresponding drawings have been placed on facing pages to make it easier to locate components.



DISPLAY
Communicates system status to the user.

KEYPAD
Used to control the system input and functions.

PINCH ROLLER
Provides correct pressure to aid capstan in advancing tape.

CAPSTAN
Advances sensing tape through detector/pressure blocks. Guides tape to take-up pin.

DETECTOR BLOCK
Contains the photo diode used for signal measurement.

GUIDE PIN
Guides sensing tape from supply roll through detector/pressure blocks.

TAPE COVER
Protects and holds the sensing tape on the supply hub and take-up pin.

SUPPLY HUB
Holds unused portion of the roll of sensing tape.

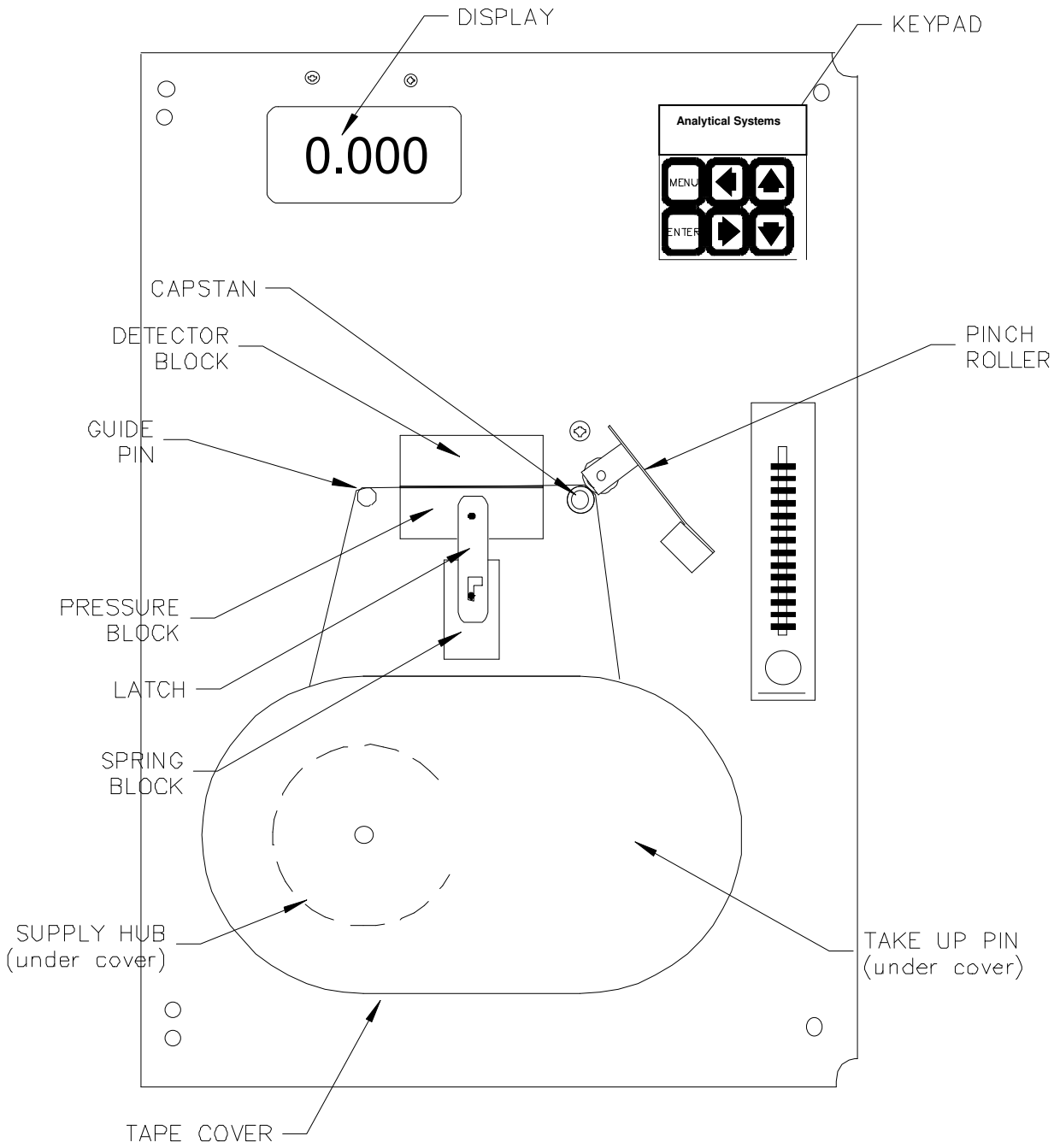
TAKE-UP PIN
Receives and holds the used portion of the sensing tape.

PRESSURE BLOCK
Provides the illumination source (red LED) for the detection/measurement process.

SPRING BLOCK/ LATCH
Enables operator to lock pressure block in the open position when loading new roll of sensing tape.

FLOWMETER
Measures and controls the flow rate of the incoming sample gas.

Front of Analyzer



FLOWMETER
Controls and measures the flow rate of the incoming sample gas. Sample enters flow meter at the bottom and exits to the humidifier at the top (both through 1/8" Teflon tubing).

MOTOR
Provides power to advance the sensing tape.

DRIVE PULLEY
Moves the drive belt during tape advances.

TERMINAL BLOCKS
Provides wiring connections for all connections in the analyzer, with the exception of the keypad and display.

DRIVE BELT
Transmits rotation from the drive pulley to the take-up pulley.

TAKE-UP PULLEY
Turns the take-up pin.

HUMIDIFIER
Humidifies the incoming sample.

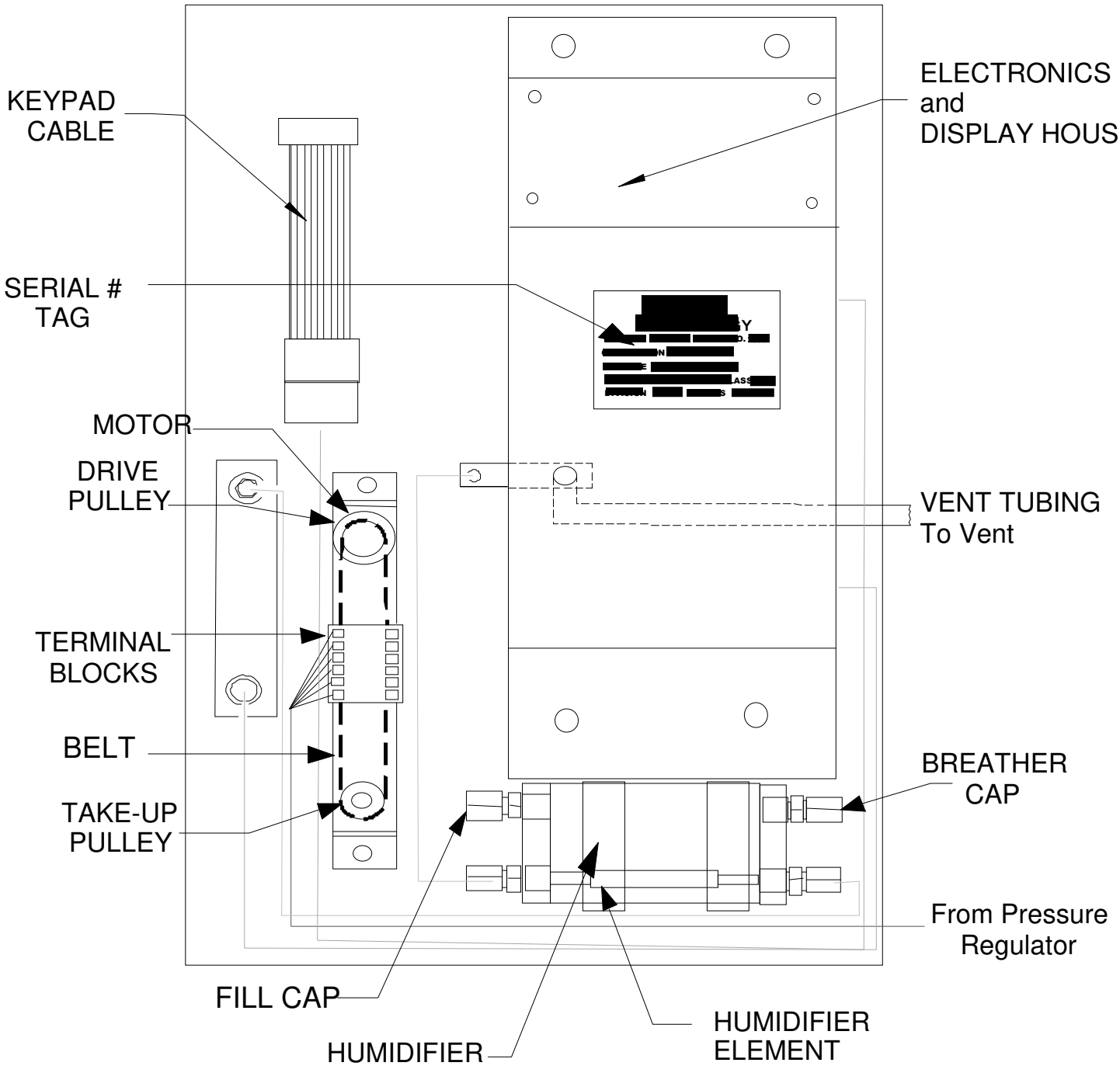
FILL CAP
Facilitates the filling of the humidifier with acetic acid, necessary for the humidification process.

BREATHER CAP
Allows the intake of air into the humidifier which prevents the occurrence of a vacuum during the humidification process. Also prevents the leakage of humidifier solution when the analyzer is in a position other than upright.

SERIAL TAG
Provides information specific to this analyzer; serial number, number, range, power and area classification.

VENT TUBING
Provides venting of the sample gas to atmospnhere after it has passed through the detector block.

Rear of Tape Deck Panel



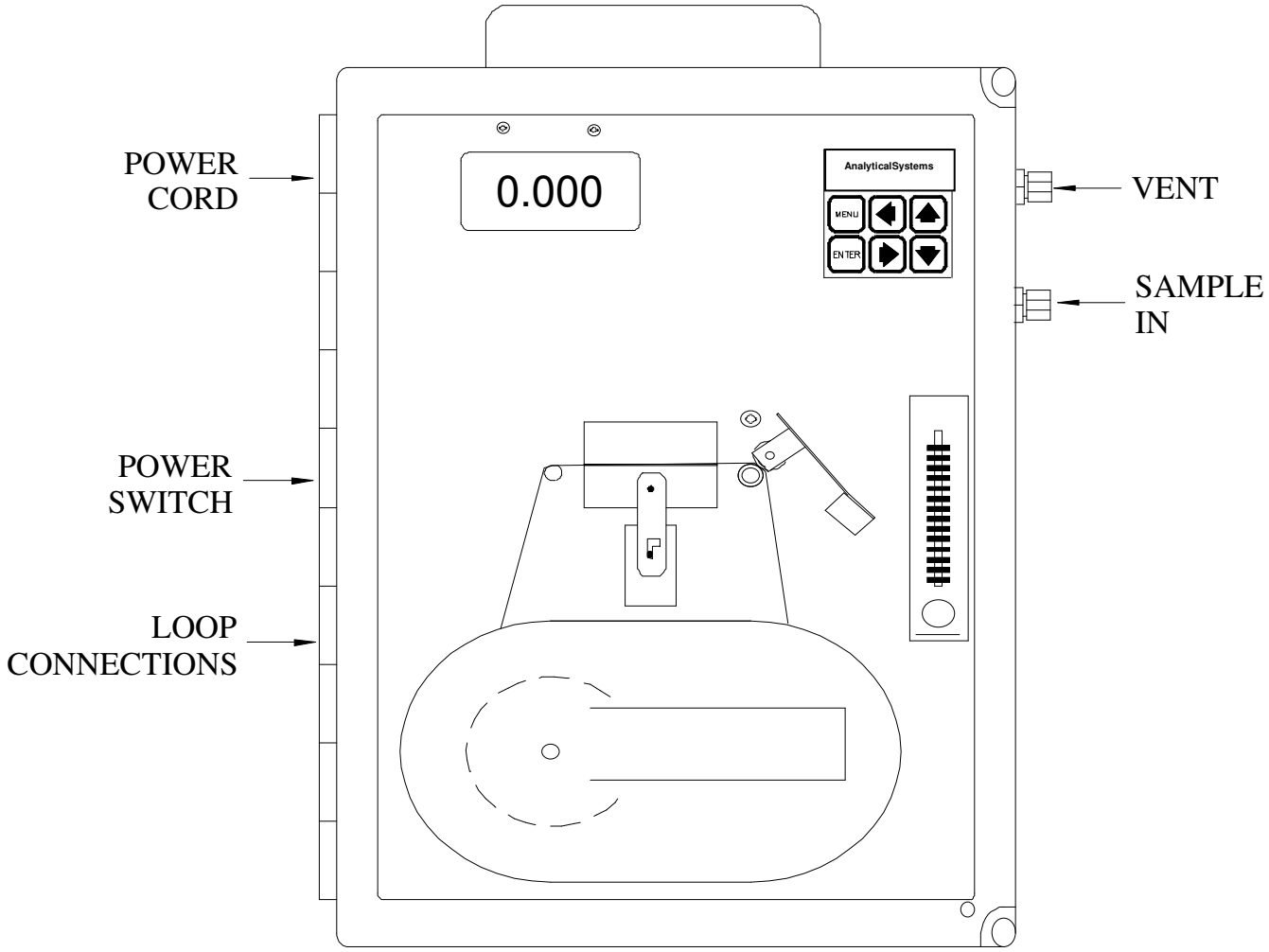
POWER SWITCH

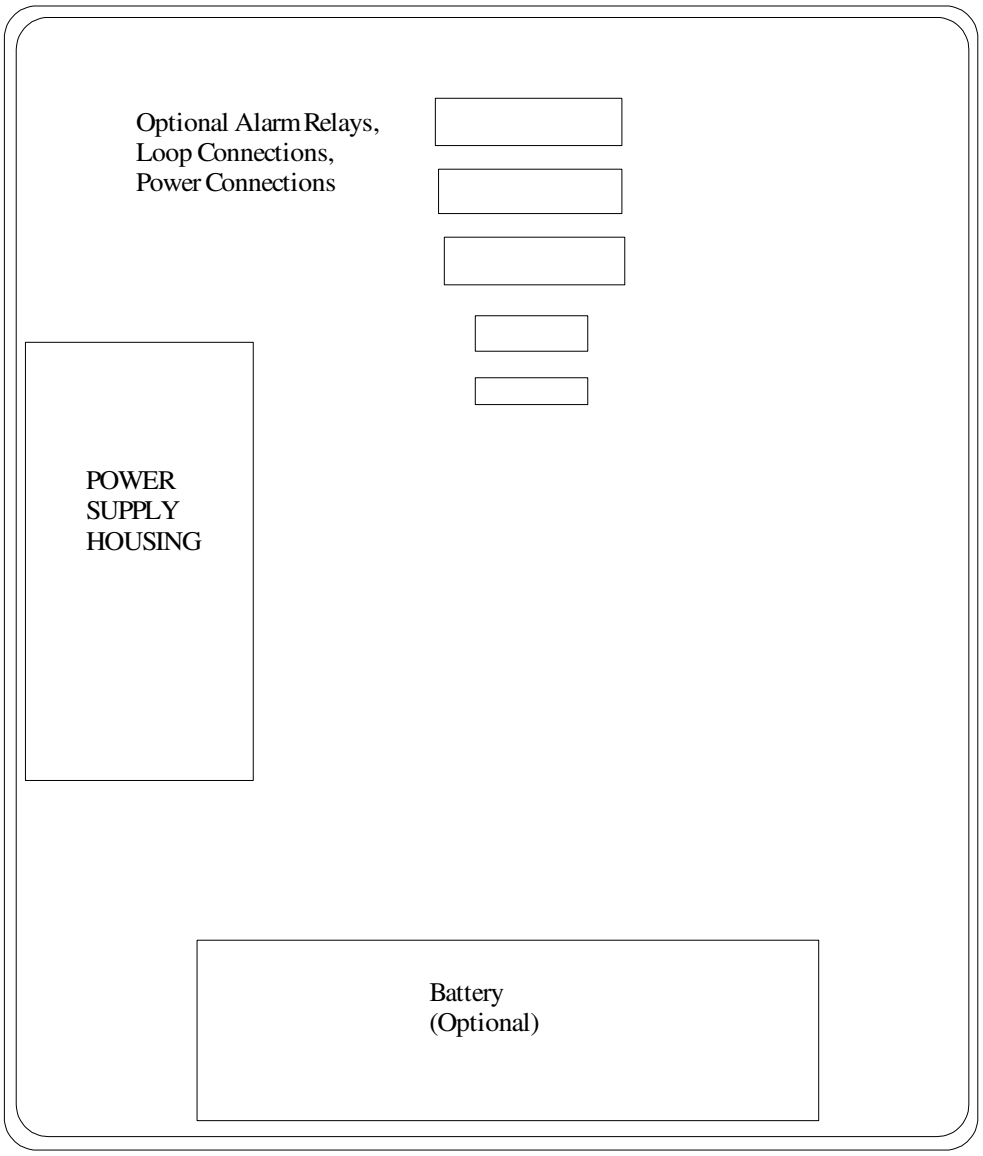
Analyzer on/off power switch. Contains wiring connections for customer power source and port for incoming power cable.

4-20 LOOP & RELAY HOUSING
Contains necessary connections for connecting customer alarms and loop devices. Port for incoming cable(s).

SAMPLE IN
Connection for sample gas line.

VENT
Allows sample gas to vent to atmosphere after passing through detector block.


POWER
CORD
POWER
SWITCH
LOOP
CONNECTIONS
0.000
AnalyticalSystems
MENU
ENTER
VENT
SAMPLE
IN


Optional Alarm Relays,
Loop Connections,
Power Connections
POWER
SUPPLY
HOUSING
Battery
(Optional)

INSIDE

Installation

The **ASI 150-II** Series H_2S analyzers are designed for use in the following area classifications:

General Purpose

Unpacking_____

- Upon receipt, visually inspect the shipping crate/box for possible damage that may have occurred in shipment. Make note of any damage.
- Open the crate/box.
- Remove any packing materials that may be inside the analyzer – around flowmeters, etc.
- Carefully remove analyzer from crate/box. **DO NOT DROP!**
- The analyzer itself should be inspected for any damage that may have occurred during shipment. If the analyzer has been damaged, the damage should be reported to the freight carrier at once, and a freight claim filed.

Location_____

Determine the site location for the analyzer. Refer to the Drawings Section for exact measurements for mounting bracket spacing.

> **NOTE:** Vertical placement of the analyzer should be such that the display is a few inches above operator eye level.

Mount the analyzer on the wall or pole(s) using adequate bolts for proper support.

Humidifier Solution_____

Fill the humidifier with solution. The humidifier is located behind the hinged tape deck panel and is accessible by opening the panel. See the Maintenance section for filling procedure.

Sensing Tape Installation_____

Install fresh roll of sensing tape. See the Maintenance Section for the installation procedure.

Power Up Analyzer_____

Install and hook up the power cord. Make sure that the power switch is in the OFF position before plugging in the power cord. Turn on the power switch. The words **ANALYTICAL SYSTEMS** will appear on the LCD panel display and the Tape Motor should run for a second. The measurement screen will automatically appear after approximately ten seconds.

Familiarize yourself with the menu pages of the display by reading **the Operation section** of this manual. Open the detector enclosure and locate the **ASI** keypad.

Set the correct date and time as follows:

1) Press the menu button on the keypad.
2) On the menu page, use the arrows to place the X cursor on "clock."
3) Press Enter.

The clock page will appear. To update date or time, place the X cursor under the number to be changed. Simply press the up or down arrow key to increase or decrease the value on the screen. Press Enter after completing the update. Press menu to escape back to the menu screen.

Connecting Vent_____

Make connection for sample vent. The vent is a 1/4" connection and is to be vented to the atmosphere.

Alarm Connections _____

Alarm connections on the **ASI** 150-II instruments are mounted internally. Refer to Alarms in the Options section for location of these connections. Care should be taken to avoid exceeding the maximum rating of these outputs, as damage to the control circuitry may occur. Follow approved wiring methods when making the connections.

Sample Hookup_____

Sample lines entering the 150-II Series analyzer are 1/8" tube fittings. The input sample line should be 316 stainless steel. We recommend that a sweep be used to insure that response time is not adversely affected by a long sample line. A pressure differential of 10 to 20 PSIG is sufficient to cause a rapid flow through the sample speed loop. The sample input pressure should be 10-15 PSIG. The sweep should be connected to the flare system or low pressure process point through a check valve. Maximum input pressures is 3000 PSIG.

Before beginning hookup, make certain that all valves, pressure regulator and flowmeter are closed.

- The pressure regulator controlling the sample pressure should be turned in a counterclockwise (decrease pressure) motion as far as possible.

1) Ensure connection of sample line to the analyzer and tighten.

2) Make certain that the "On Line/Man Cal" valve is in the "On Line" position.

3) Open (turn counterclockwise) the sample-in valve on the valve panel.

4) Turn the sample pressure regulator knob clockwise (increase pressure) until the pressure on the gauge reads 9 PSIG.

5) Open (turn counterclockwise) the sample flowmeter to read .3 on the scale.

At this point your air and sample should be flowing through the analyzer.
On Line/Man Cal valve should be in the On Line position
Sample pressure gauge should read 9 PSIG
Sample flowmeter should read .3 on the scale
DO NOT PROCEED if sample is not flowing.

If you do not achieve successful sample flow set up return to step 1. Check your sample line connection and repeat steps 2 through 5 as many times as necessary to achieve a successful sample flow set up.

Installation Check List_____

! UNPACK the analyzer
- ___ Visual inspection for possible damage
- ___ Remove any operating supplies and spare parts

! MOUNT analyzer

! Add HUMIDIFIER SOLUTION

! Install TAPE

! POWER UP analyzer
- ___ Observe LCD panel for logo screen and measurement screen
- ___ Set date and time

! CONNECT GAS lines
- ___ Vent (sample out)
- ___ Sample In
- ___ Speed Loop (excess sample out)

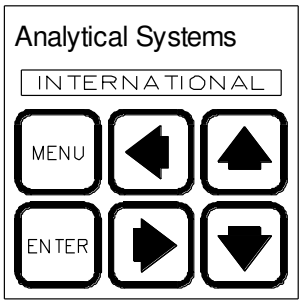
! Begin SAMPLE FLOW
- ___ Open sample-in value
- ___ Set on-line valve
- ___ Set sample pressure to 9 PSIG
- ___ Set sample flowmeter to .3 on the scale

! Setup Alarms and Options
- ___ Manual Cal Span Gas
- ___ Set Clock to Local Time

Operation

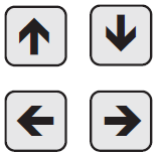
Keypad_____

All operations of **ASI** analyzers are accessed through the menu by use of the keypad.



The MENU key pulls up the main menu and returns you to this main menu from any other menu page.

The enter key pulls up the operating page of an option you have selected with your cursor on the main menu. It is also used to enter any numerical changes you have made to any portion of the operations. After entering the number you desire to use, press ENTER. The number you entered is then saved to memory.



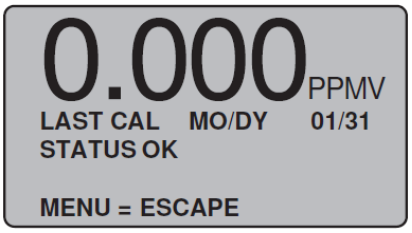
The up and down arrows are used to move your cursor about in the menu. On the operations pages, these arrows change numbers and options, while the left and right arrows move the cursor.

Title Screen_____

The title screen is the first screen to appear after the analyzer is powered up. This screen displays the **ASI** logo and the model number for approximately three to five seconds.

Status Screen_____

At power on, the title screen is replaced by the status screen in three to ten seconds.
The status screen shows the current measured amount of H_2S present in the stream and the current status. The current status may show "Status OK" or other such pertinent system information.

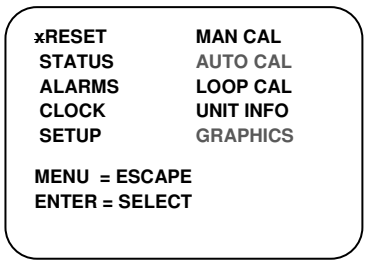


Use the ↓ and ↑ to adjust the screen contrast for optimum viewing. If the screen is too dark, use ↓ to brighten. If the screen is too light use ↑ to darken. With a color LCD, pressing ENTER while pressing the ↓ or ↑ will adjust the brightness.

Entering the MENU key at this point will display the main menu.

Main Menu_____

The main menu displays all the page options in the program. When the main menu is first displayed, the cursor will appear next to RESET. Menu screen text shown in dark gray, indicate options that are not available on all analyzers.
Move about the menu by using the up or down arrow. You may choose from:



RESET - Clears and resets alarms, stops any calibration in progress and advances the tape.

STATUS - Shows the current status of the analyzer.

ALARMS - Allows the optional alarms on the analyzer to be set, enabled or disabled. Alarms are optional. See the Alarms Option section for more information.

CLOCK - Allows the system clock to be set.

SETUP - From the SETUP screen the Tape Change, LED calibrate and other functions can be accessed.

MAN CAL - Manual Calibration page. Allows you to set and start manual calibration.

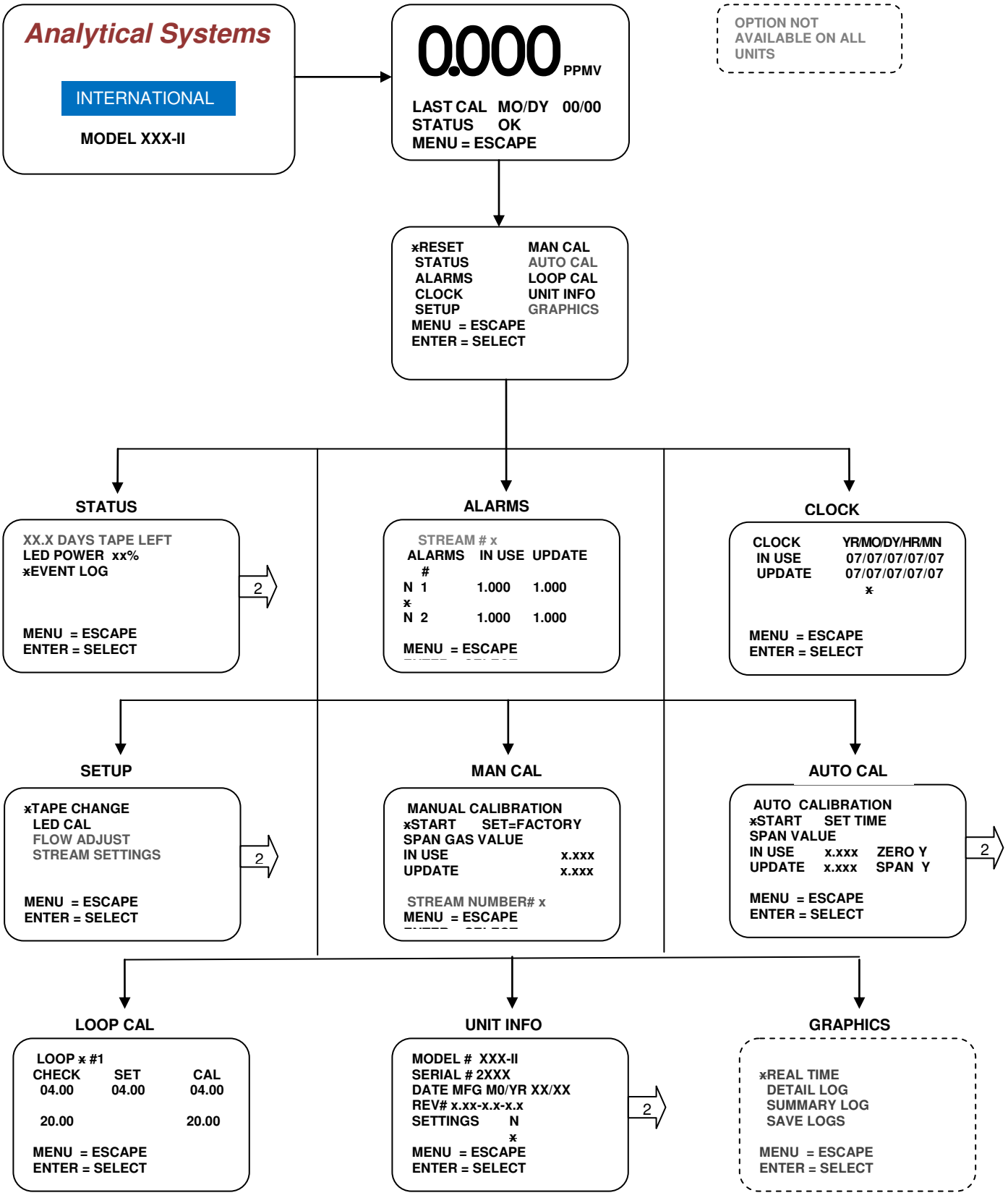
AUTO CAL - Auto Calibration page. Allows you to set timer for auto calibration. Auto Calibration is optional. See the Auto Calibration section in the Options section.

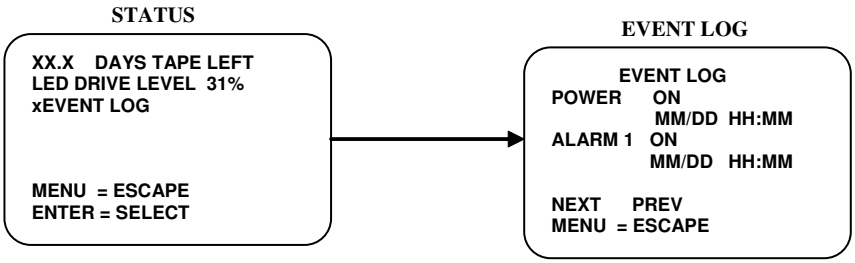
LOOP CAL - Allows you to calibrate any equipment on your 4-20mA loop. The 4-20mA loop is optional.

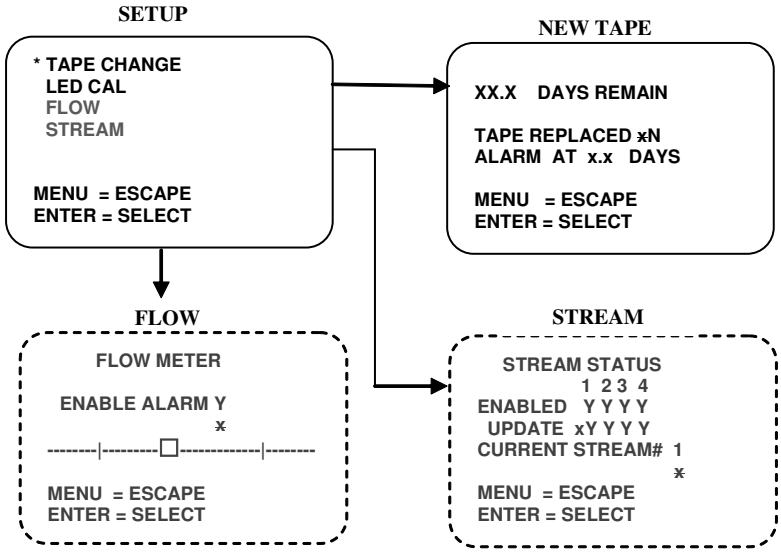
UNIT INFO - Displays all file information on this particular unit.

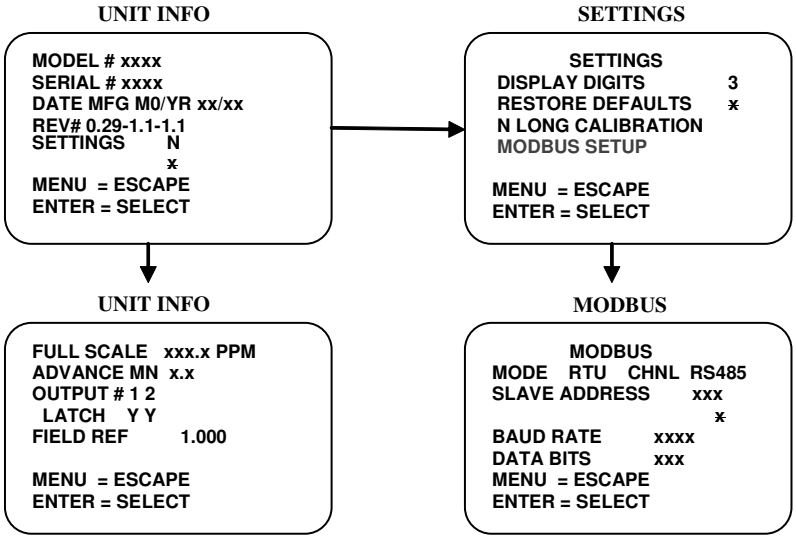
GRAPHICS - Allows graphical display of real time or historical data.

On the following pages, detailed instructions will be given on how to use each menu page. Pay particular attention to information provided in boxes.

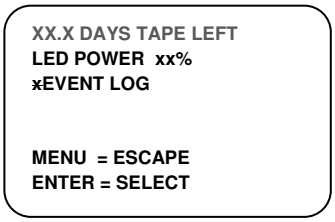

Analytical Systems
INTERNATIONAL
MODEL XXX-II
0.000 PPMV
LAST CAL MO/DY 00/00
STATUS OK
MENU = ESCAPE
OPTION NOT AVAILABLE ON ALL UNITS
*RESET
STATUS
ALARMS
CLOCK
SETUP
MAN CAL
AUTO CAL
LOOP CAL
UNIT INFO
GRAPHICS
MENU = ESCAPE
ENTER = SELECT
STATUS
XX.X DAYS TAPE LEFT
LED POWER xx%
*EVENT LOG
MENU = ESCAPE
ENTER = SELECT
2
ALARMS
STREAM # x
ALARMS IN USE UPDATE
1 1.000 1.000
* 2 1.000 1.000
MENU = ESCAPE
CLOCK
CLOCK YR/MO/DY/HR/MN
IN USE 07/07/07/07/07
UPDATE 07/07/07/07/07
*
MENU = ESCAPE
ENTER = SELECT
SETUP
*TAPE CHANGE
LED CAL
FLOW ADJUST
STREAM SETTINGS
MENU = ESCAPE
ENTER = SELECT
2
MAN CAL
MANUAL CALIBRATION
*START SET=FACTORY
SPAN GAS VALUE
IN USE x.xxx
UPDATE x.xxx
STREAM NUMBER# x
MENU = ESCAPE
AUTO CAL
AUTO CALIBRATION
*START SET TIME
SPAN VALUE
IN USE x.xxx ZERO Y
UPDATE x.xxx SPAN Y
MENU = ESCAPE
ENTER = SELECT
2
LOOP CAL
LOOP * #1
CHECK SET CAL
04.00 04.00 04.00
20.00 20.00
MENU = ESCAPE
ENTER = SELECT
UNIT INFO
MODEL # XXX-II
SERIAL # 2XXX
DATE MFG M0/YR XX/XX
REV# x.xx-x.x-x.x
SETTINGS N
*
MENU = ESCAPE
ENTER = SELECT
2
GRAPHICS
*REAL TIME
DETAIL LOG
SUMMARY LOG
SAVE LOGS
MENU = ESCAPE
ENTER = SELECT


STATUS
XX.X DAYS TAPE LEFT
LED DRIVE LEVEL 31%
xEVENT LOG
MENU = ESCAPE
ENTER = SELECT
EVENT LOG
EVENT LOG
POWER ON
MM/DD HH:MM
ALARM 1 ON
MM/DD HH:MM
NEXT PREV
MENU = ESCAPE


SETUP
* TAPE CHANGE
LED CAL
FLOW
STREAM
MENU = ESCAPE
ENTER = SELECT
NEW TAPE
XX.X DAYS REMAIN
TAPE REPLACED xN
ALARM AT x.x DAYS
MENU = ESCAPE
ENTER = SELECT
FLOW
FLOW METER
ENABLE ALARM Y
x
--------|---------□----------|--------
MENU = ESCAPE
ENTER = SELECT
STREAM
STREAM STATUS
1 2 3 4
ENABLED Y Y Y Y
UPDATE xY Y Y Y
CURRENT STREAM# 1
x
MENU = ESCAPE
ENTER = SELECT

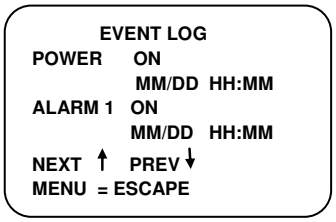

UNIT INFO
MODEL # xxxx
SERIAL # xxxx
DATE MFG M0/YR xx/xx
REV# 0.29-1.1-1.1
SETTINGS N
x
MENU = ESCAPE
ENTER = SELECT
SETTINGS
SETTINGS
DISPLAY DIGITS 3
RESTORE DEFAULTS x
N LONG CALIBRATION
MODBUS SETUP
MENU = ESCAPE
ENTER = SELECT
UNIT INFO
FULL SCALE xxx.x PPM
ADVANCE MN x.x
OUTPUT # 1 2
LATCH Y Y
FIELD REF 1.000
MENU = ESCAPE
ENTER = SELECT
MODBUS
MODBUS
MODE RTU CHNL RS485
SLAVE ADDRESS xxx
x
BAUD RATE xxxx
DATA BITS xxx
MENU = ESCAPE
ENTER = SELECT

Status



Choosing STATUS from the Main Menu pulls up the Status page. This page shows you the current status of the analyzer.

- The LED Power from the Last LED CAL is displayed.
- The three highest priority alarms are displayed.
- The ⬇ may be used to page down if there are additional alarms.
- The EVENT LOG logs events such as Alarms being triggered, Alarms being cleared, Reset functions, Calibrations started etc.
    - Press ENTER to see the two most recent events.
    - Use the UP and Down arrows to page through the events
    - Press Menu to return to the STATUS SCREEN



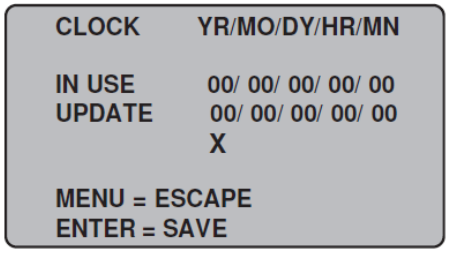
- Instruments with the Low Tape Alarm Option will have the number of days of tape remaining displayed. See the Low Tape Alarm Option section for more information.

You may check the status page at any time by going to the Main Menu and selecting STATUS.

Alarms

Alarms are optional. Information on this option can be found in the Options section of this manual if you have purchased that option.

Clock



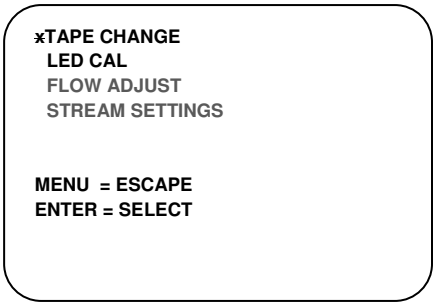
Choose CLOCK from the Main Menu to pull up the Clock page.

On this page you set the system time and date. To choose the necessary numbers, use ⬇ and ⬆ After the time and date have been correctly set, Press ENTER to save the information to system memory. Press MENU to return to the Main Menu.

Analyzers with Serial Number greater than 2000 always have years in the 21'st century. If a year is "00" this indicates the year 2000. If a year is "98" this indicates the year 2098.

Setup_____

The Setup Screen allows setup and maintenance functions to be performed. When the SETUP screen is entered, the Analyzer is off line. If no action is taken for 5 to 6 minutes, the analyzer will automatically will return to online.



TAPE CHANGE - Use this screen when changing tape. For additional information on this function see Installing Sensing Tape in the Maintenance

- **LED CAL** - This function allows the LED light source to be calibrated to white tape. Normally the LED is calibrated when the sensing tape is replaced but the LED can be calibrated at any time by using this function. See LED Calibration in the Maintenance section.
- **FLOW ADJUST** - If the Analyzer has the Electronic Flowmeter option, use that part of the Option section.
- **STREAM SETTINGS** - If the Analyzer has multiple Ranges/Streams, use that part of the Options section.

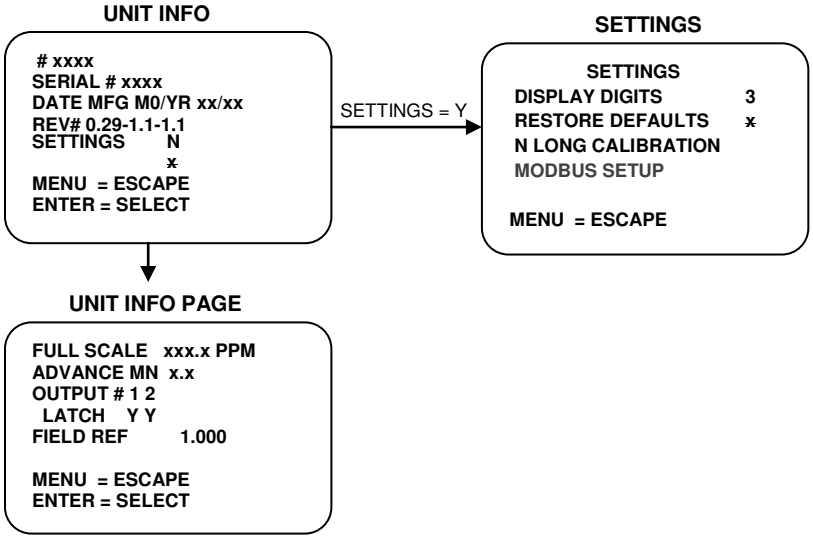
Manual Calibration_____

This function allows the analyzer to be calibrated with a known H2S standard calibration gas. See the Maintenance section for more details.

Auto Calibration_____

Auto Calibration is optional. Information on this option can be found in the Options section of this manual, if you have purchased this option.

Unit Information_____



When you choose the Unit Info page from the main menu, this page will be displayed. There are two pages containing unit information. To see the second page, press ENTER.

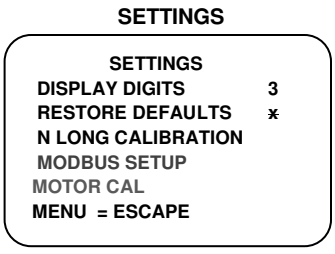
The information contained on these two pages was stored in the system memory at the factory. It is meaningful information that will be of help if you ever need to call the factory for help in operations or service.

The following information is provided on the two pages:

Page 1

#	The model number of this analyzer.
SERIAL #	The factory assigned serial number of this analyzer
DATE	The month and year that the analyzer was shipped.
REV. #	The revision number, if any, of the software version in this analyzer.

SETTINGS:



If the ↑ or ↓ is used on the first page to set SETTINGS to Y and then pressing ENTER the SETTINGS menu is displayed. Functions on this screen are for advanced users only. Changing these settings should only be done in consultation with Analytical Systems Technical Support.

DISPLAY DIGITS Sets the number of decimal points to show on the Status Screen display.

RESTORE DEFAULTS Restores the instrument to the Factory defaults set in the software. After defaults are restored, all user settings must be verified. Alarms, Calibration Gas Values etc.

LONG CALIBRATION If this is set to Y, the next calibration will include a low level fundamental adjustment of the way the analyzer calculates readings.

MODBUS SETUP See the Modbus Section of the Options section for information on Modbus Setup.

MOTOR CAL See the Low Tape Alarm Option section for information on this function.

Page 2

FULL SCALE This is the full scale range of the analyzer (i.e. If a range of 0 - 1 PPMV was ordered , then FULL SCALE would read 1PPMV) If the Range Change option is installed, use the left or right arrow on the first page to change the alarm latch settings and the range. Range changes are primarily to set the scale and the 4-20mA loop output. The responsiveness and stability of the reading will be best at the range on the serial number tag.

ADVANCE MN This is the maximum length of time between tape advances.

OUTPUTS Displays the concentration alarm outputs on the analyzer and whether or not they are latching.

FIELD REF Reference number to relate field calibration source.

Graphics_____

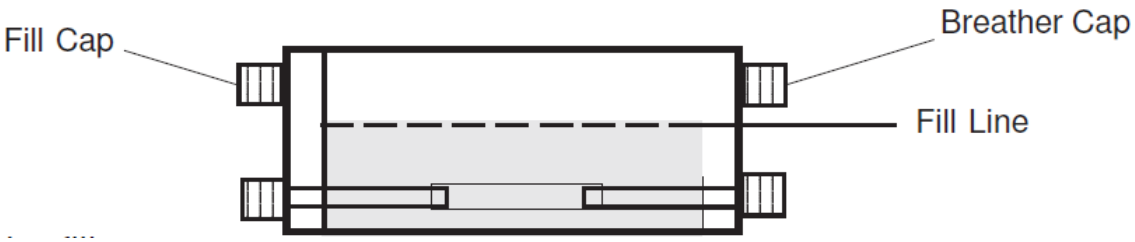
Graphics screens present real time and historical data in a graphical format. For more information on the Graphics option, see the Option section.

Loop Calibration_____

The 4-20mA output loop is optional. Information on this option can be found in the options section of this manual, if you have purchased this option.

Maintenance

Filling the Humidifier with Solution_____



1) Remove the Fill Cap located on the upper left side of the humidifier. Never remove the Breather Cap. The humidifier is located on the rear of the tape deck panel.
2) Using a clean fill bottle, add new **ASI** humidifier solution through the fill cap opening. **CAUTION: DO NOT fill the humidifier above the level of the fill cap and breather cap.**
3) Replace the fill cap.

> **NOTE: Filling the humidifier with anything other than humidifier solution (5% acetic acid) can permanently damage the membrane tubing inside the humidifier and necessitate replacement.**

4) If the Humidifier solution is contaminated, the solution should be replaced. Contaminated solution will appear very cloudy or yellow. If in doubt proceed to step (5.
5) Press air out of an empty fill bottle (shipped with the analyzer - packed in the box with humidifier solution) and insert the end of the tube through the fill cap opening into the solution to be removed. Suction out old humidifier solution and discard.
6) Begin again with step (2.

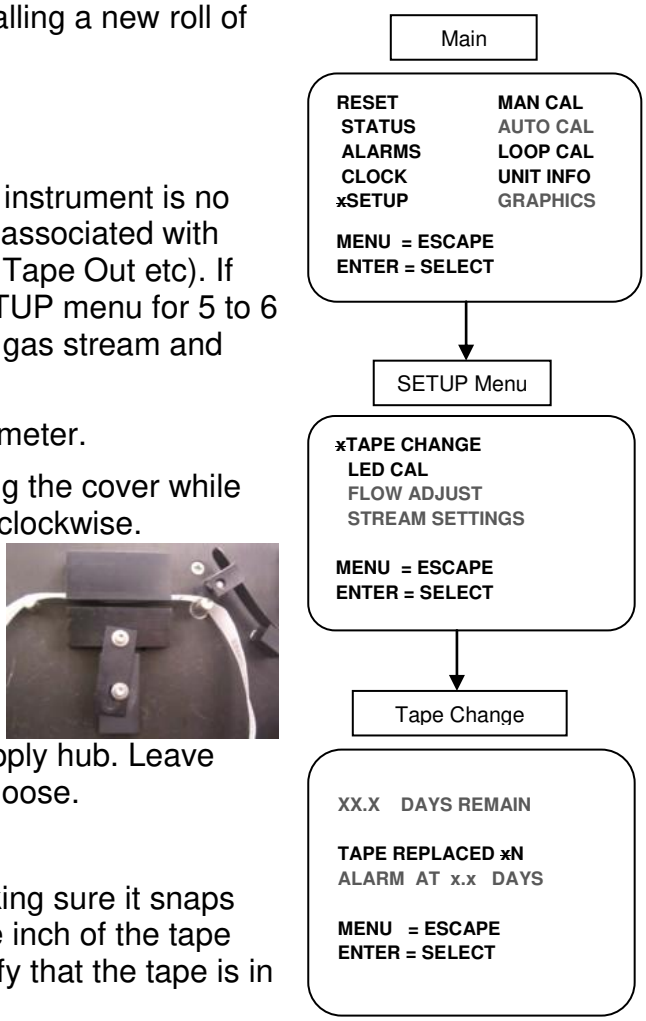
Installing Sensing Tape_____

The following procedure is not required to change tape. Using this procedure will prevent unnecessary alarms during tape change.

Complete the following steps when installing a new roll of sensing tape:

1) Enter the SETUP menu.
2) Enter the Tape Change Menu.

Note: After the SETUP menu is entered, the instrument is no longer reading the gas stream. Alarms associated with setup will not be activated (Tape Dark, Tape Out etc). If the instrument is left unattended in SETUP menu for 5 to 6 minutes, it will return to processing the gas stream and activate the alarms.



3) Turn off the Gas Flow at the flowmeter.
4) Remove the tape cover by holding the cover while turning the knob 1/4 turn counterclockwise.
5) Depress and latch the spring-loaded pressure block.
6) Remove the old tape from the analyzer.

7) Place a full roll of tape on the supply hub. Leave approximately 10 inches of tape loose.
8) Place the loose tape in the slot.
9) Release the pressure block (making sure it snaps back in place) and pull about one inch of the tape through the detector head to verify that the tape is in the proper position.
10) Attach the tape to the take-up pin with a small bit of adhesive tape.
11) Rotate the take-up pin clockwise to remove as much slack as the take-up drive will permit. The slip-clutch action of the drive will take up the balance of the slack.
12) Replace the tape cover.
13) Press the Up Arrow to so that TAPE REPLACED in the MENU has a Y then press ENTER.
14) A screen will appear prompting for the correct conditions for an LED calibration.
    a. Press the ENTER key to calibrate the LED. The tape should move about 1/8” to 1/4” and stop.

b. If an LED calibration is not desired, press the MENU key.

15) The screen will return to the Tape Change screen.

16) Press MENU to return to the SETUP screen.

17) The LED power remaining will be displayed at the bottom of the Setup Screen.

18) Set the Analyzer flow to the desired flow rate 0.3SCFH.

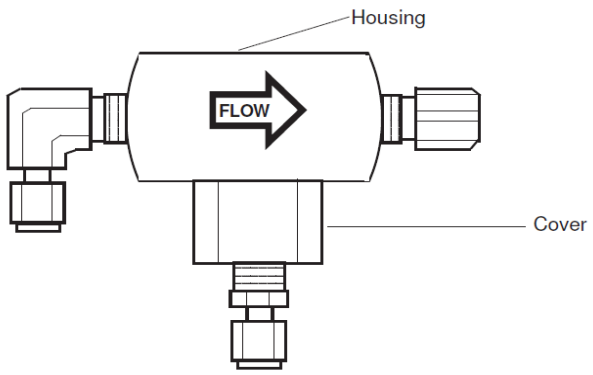
19) Press MENU to return to the main menu and begin gas sampling.

20) Press RESET on the Menu Page and check for proper tape advance. The tape should move approximately 1/8” to 1/4" and stop.

Sample Filter Element Replacement_____

(If your analyzer is equipped with the optional Liquids Removal Filter, see the Options section of this manual for instructions on changing the membrane.)

1. Verify that the inlet sample flow and sweep outlet isolation valves are closed.



2. Loosen and remove the threaded filter element cover (the element will be inside).

3. Backflush and clean the porous metal element and replace into the cover.

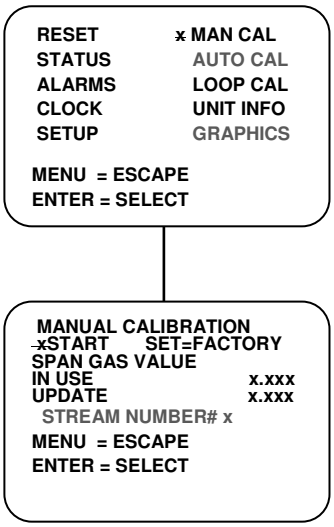
4. Re-thread the filter element cover onto the filter housing.

5. Reopen sample isolation valves.

Manual Calibration_____

Analytical Systems Analyzers do not require periodic calibration. If calibration is required due to environmental conditions, the following procedure may be used.

1. From the main menu, select MAN CAL.



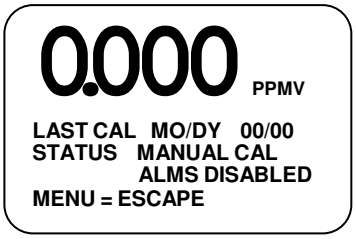
The Manual Calibration screen appears as shown with the cursor appearing beside START.

2. Use ← and/or → to move the cursor to a position beneath the first digit of the update span gas value.
3. Use ↑ and/or ↓ to set the desired span gas value.
4. ENTER to save the chosen value.

> **NOTE:** To determine whether or not the value has been saved, look at the IN USE value after pressing ENTER. The IN USE value should be the same as the UPDATE value.

You may change the SPAN GAS VALUE as many times as necessary before beginning the calibration.

5. Verify that Calibration Gas is connected to the analyzer.
6. Use ← and/or → to move cursor back to START. ENTER to begin calibration.



When the calibration is started, the Status Screen will appear as shown. It denotes that calibration is on and that any alarms are disabled during this process. You will note the digits changing as calibration occurs.

When the calibration is complete the screen will change to show STATUS CAL COMPLETE and ALARMS DISABLED. The LAST CAL date will change to the current Month and Day. The FIELD REFERENCE value in the UNIT INFO page will reflect the new correction factor.

7. Wait for the reading to return to the online value.
8. Press Menu and Enter to Reset the Analyzer and enable the alarms.

The calibration process may be stopped at any time. Turn the ONLINE/MANUAL CAL valve back to ONLINE. When the reading is low enough not to cause unwanted alarms, return to the main menu and choose RESET. This will stop the calibration program, enable the alarms and advance the tape. Escaping from the calibration page DOES NOT stop calibration.

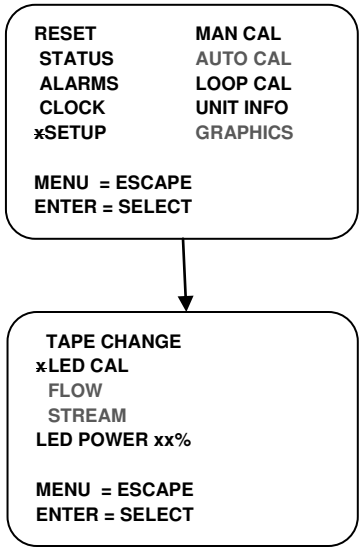
If a calibration does not produce the desired results, the analyzer may be returned to the Factory calibration by placing the cursor at SET=FACTORY and pressing ENTER. The FIELD REFERENCE will be set to 1.000 which is the FACTORY setting.

LED Calibration_____

1. Enter the SETUP Menu.

Note: After the SETUP menu is entered, the instrument is no longer reading the gas stream. Alarms associated with setup will not be activated (Tape Dark, Tape Out etc). If the instrument is left unattended in SETUP menu for 5 to 6 minutes, it will return to processing the gas stream and activate the alarms.

2. Turn off the flow to the analyzer.
3. Verify that white tape is in the detector.
4. Verify that the detector block is fully closed.
5. Place the cursor beside the LED CAL line and press ENTER.
6. A screen will appear prompting for the correct conditions for an LED calibration.
   - If an LED calibration is not desired, press the MENU key.
   - Press the ENTER key to calibrate the LED. The tape should move about 1/8" to 1/4" and stop.
5. The screen will return to the Setup screen in a few seconds.
6. The tape should move 1/8 to 1/4 inches. The result of the calibration will be displayed at the bottom of the screen.



   - The result displayed indicates the amount of LED power remaining.
   - When the amount of LED power remaining drops below 20%, LOW LED will be displayed. The Detector Block should be cleaned and/or the pressure block should be replaced at the next scheduled maintenance.
   - If the LED cannot be calibrated, CAL FAIL will be displayed on the Setup Screen and on the Status line of the Status Screen. Use the RESET function to clear the CAL FAIL alarm from the Status Screen.

- LOW LED does not mean that the Analyzer may not be used. The LED status is checked at each tape advance. Additional diagnostic alarms will be presented at tape advance.
- When CAL FAIL appears after an LED CAL, the reason for failure should be determined and corrected.
- The detector voltage on positon 3 and 4 of the terminal block on the tape deck panel should be 120 +/- 20mV.

When LED calibration is complete, restart the flow to the Analyzer and press Menu to exit the Setup screen and return the Analyzer to on-line status.

Problem Solving

Because of the advanced state-of-the-art microprocessor and other electronic circuitry, **ASI** analyzers are not normally serviced in the field. If the instrument fails to start-up or operate properly, check the following:

Always keep these two basics in mind when trouble shooting:

1. **LOOK FOR THE OBVIOUS** - Most often problems prove to be basic and are easily corrected.
2. **CHECK OUT ONE SEGMENT OF THE SYSTEM AT A TIME** - First, prove the operation of the basic segments. Then check the operation of the entire system.

Power_____

Verify that the system power is properly connected, and has the correct voltage.

Humidifier_____

Erratic readings can result if the humidifier is not functioning properly. Verify that the humidifier is properly filled, and that the humidifier has not become contaminated. Refer to the drawing of the rear of the tape deck (pg. 3-5) for location of the humidifier. If the humidifier solution has become contaminated, drain and refill the humidifier with the proper solution. See page 2-3 for instructions on changing the humidifier solution.

Gas Flow_____

Verify that the flows are set as follows:

On-Line/Man Cal	to On-Line
Sample Pressure Gauge	9 PSIG
Sample Flowmeter	0.3

Adjust, if necessary.

Drive Motor_____

Verify that the motor is functioning properly. Press RESET on the Menu Page and watch for a tape advance. The tape should move approximately 1/8” to 1/4" and stop.

Pinch Roller Assembly _____

The Roller on the Pinch Roller should turn freely. The roller should not be touching the Tape Deck Panel. The spring on the Pinch Roller should not be bent. If the Pinch Roller is not functioning properly, it should be replaced.

Illumination Source_____

Verify that the illumination source is functioning properly by depressing the tape pressure block. A red glow should be noted. If there is doubt about the strength of the Illumination Source, calibrate the LED by the procedure in the Maintenance section.

Exhaust Line_____

Verify that the line is not blocked. Back pressure will cause erratic readings and can be evidenced by non-uniform darkening of the **ASI *Tape***.

The Problem Solving section on the next pages lists common alarms and solutions. Alarms and problem solving with optional features are listed in the option section.

If you are unable to correct or determine the exact problem, call the **ASI** factory (Phone 713-462-6116or Fax 281-351-8925). Personnel will assist you in diagnosing the problem. Have the information from the serial tag at hand when you call the factory.

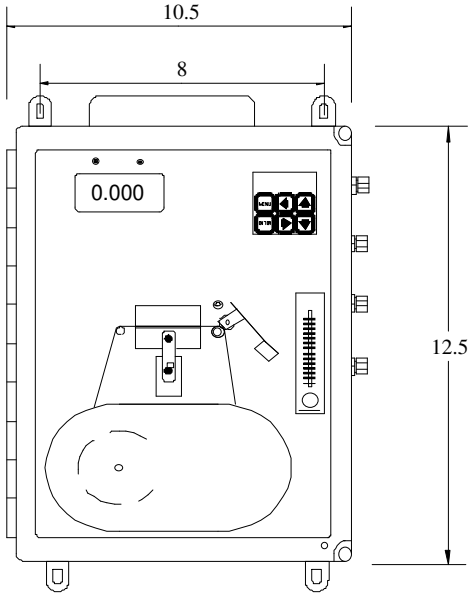
PROBLEM SOLVING

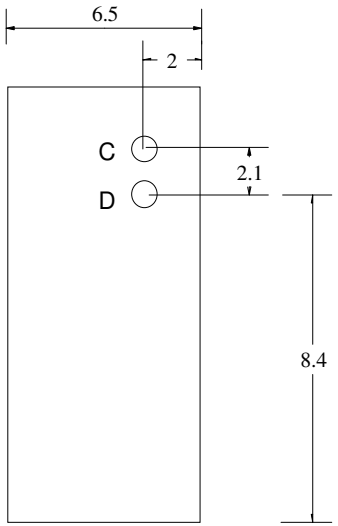
INDICATION	PROBLEM	CHECK FOR	CORRECTIVE ACTION
Blurred spots on tape	Back Pressure on Vent	Vent Blockage	Remove Blockage, vent to atmosphere
Tape Darkening other Than spots	Sample leak	Leaks in sample flow path	Seal leaking connections
Dark Splotches	Pressure Block out of position	Block Position	position pressure block against tape in slot
Tape Dark Alarm 9999 Reading	Low Voltage from detector	LED on (pull down block to see light)	If no LED light, check connections and/or pressure block.
		Tape advances when RESET entered	If motor runs but tape does not advance, Increase pinch roller pressure on paper If motor does not run, check connections or replace motor
	H_2S over range	Excessive dark spots with smear between spots.	Remove source of over range sample or Upgrade to higher range analyzer
	Pressure Block out of position	Dark splotches on tape	Position pressure block against tape in the slot
	Dirt in light path	Measure voltage from detector	Clean detector and pressure block and/or Calibrate LED
Tape Out Alarm 9999 Reading	High voltage from detector	Tape out of block	Install tape
		Measure voltage from detector on white tape (~0.120VDC +/- 0.010V	Recalibrate LED

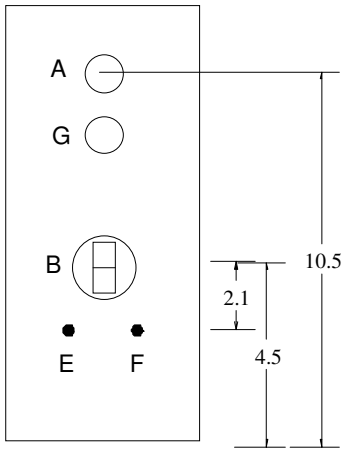
INDICATION	PROBLEM	CHECK FOR	CORRECTIVE ACTION
LED Cal Fail	Immediately after LED calibration, the LED adjustment was at the end of the high/low adjustment range or the voltage from the detector was too unstable to calibrate.	No tape in Pressure Block	Put tape in Pressure Block
		Pressure Block not closed properly	Snap Pressure Block into position
		Weak Light Source	Replace Pressure Block
		Dirty/Weak detector	Clean/Replace Detector Block
Cal Fail	Auto Calibration Error	See the Auto Calibration Section	
OVER RANGE	H_2S over range	Excessive dark spots with smear between spots.	Remove source of over range sample or Upgrade to higher range analyzer, see TAPE DARK above.
		Tape not advancing	Tape should advance 1/8 to ¼ inch after RESET.
		Reading is higher than Analyzer Range	See Above
		Reading is too high to display	See Above
LOW LED	During normal operation, indicates that the analyzer is able to read the tape but the detector output Is half of normal. Responsiveness may be affected.	LED not properly calibrated	Calibrate LED
	Immediately after LED cal the LED power remaining is less than 20%.	Old/weak Light source	Replace Pressure Block
		Dirty/Weak detector	Clean/Replace detector
		Tape not advancing properly	Verify that tape moves when RESET entered and that spot spacing is normal

INDICATION	PROBLEM	CHECK FOR	CORRECTIVE ACTION
SYSTEM ERROR	An internal error in the electronics	SYSTEM ERROR xx where xx is a Number between 10 and 99	Contact Technical Support with the Error Number

Drawings

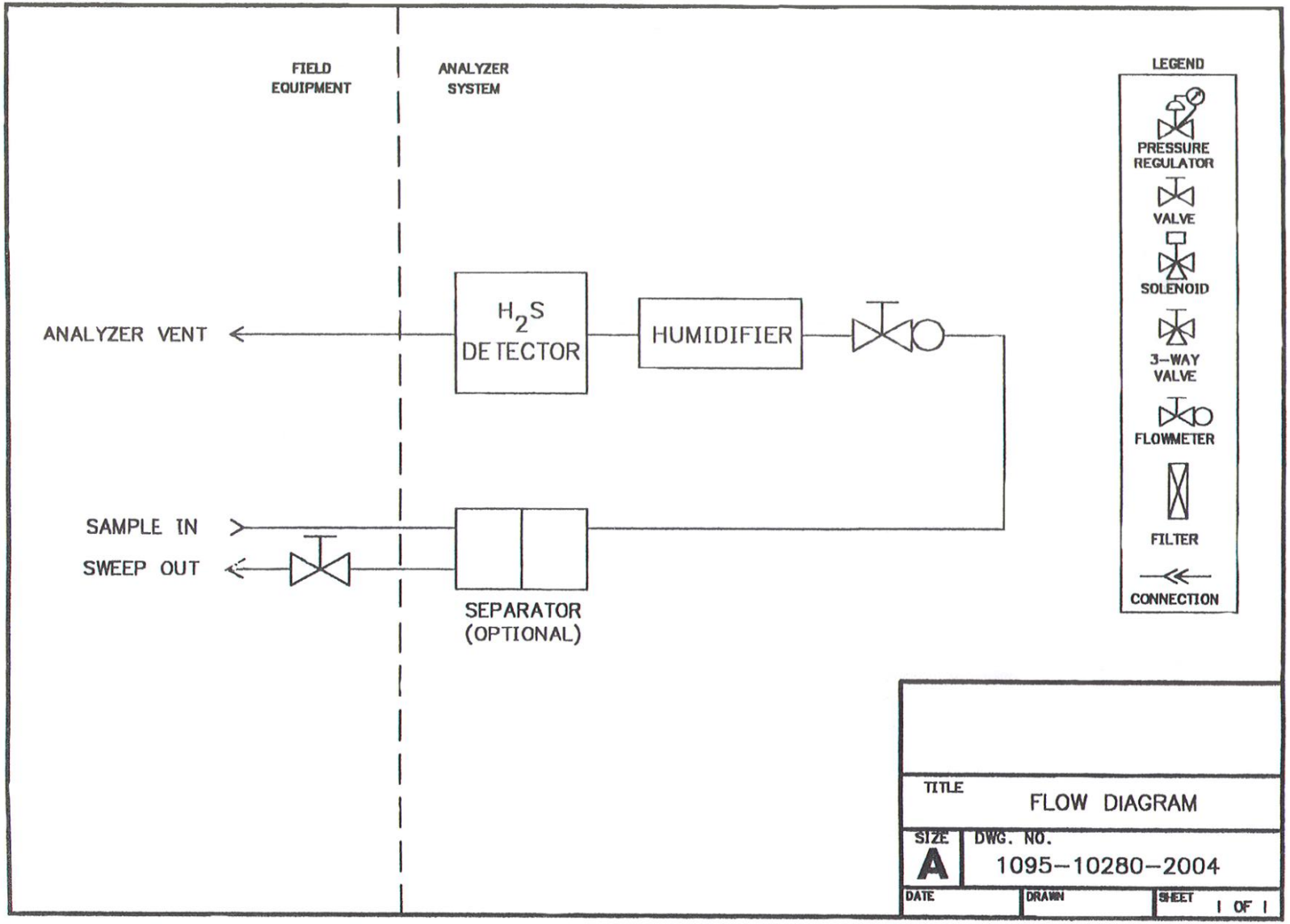


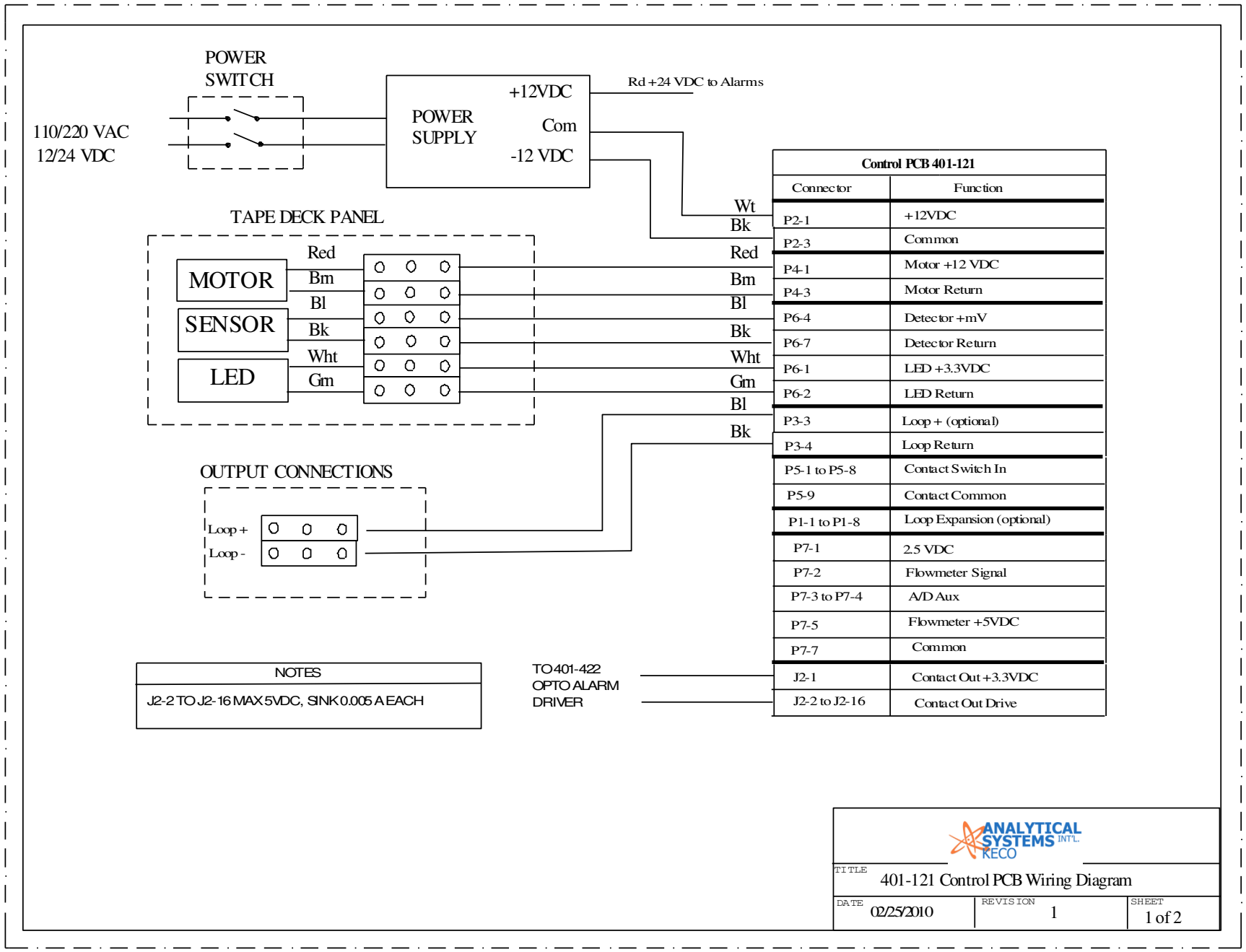


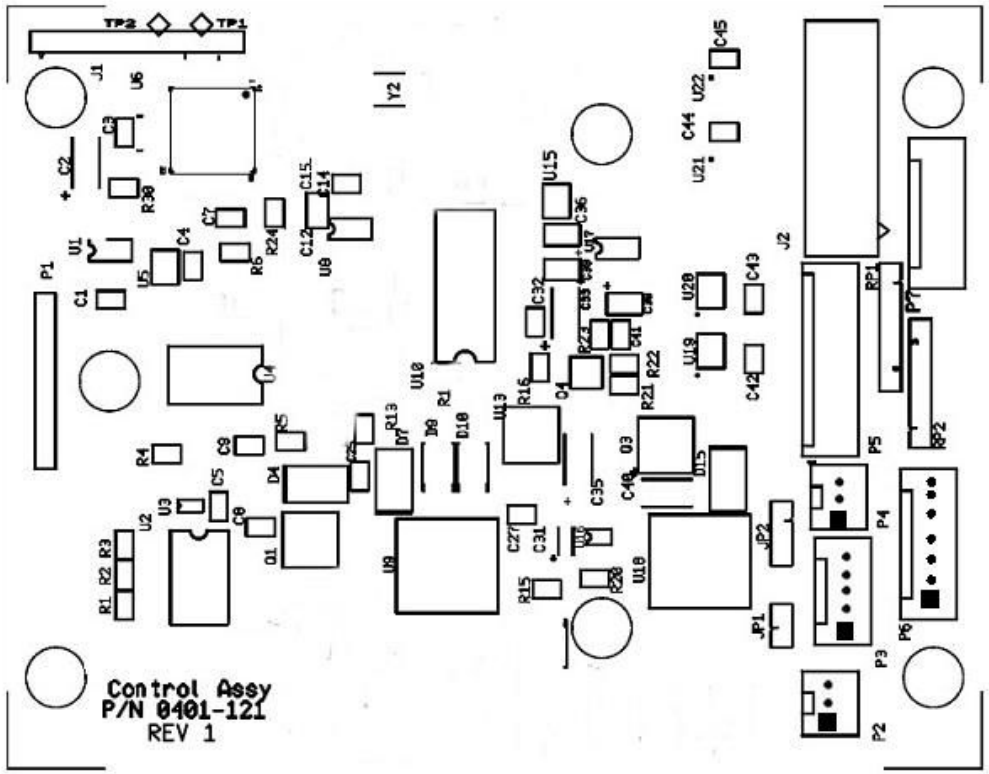


	MOUNTING AND CONNECTION DIMENSIONS
A	POWER IN
B	POWER SWITCH
C	1/4" TUBE ANALYZER VENT
D	1/8" TUBE SAMPLE IN
E	LOOP +
F	LOOP -
G	OPTIONAL CONNECTION
H	

Analytical Systems		
TITLE: Series 150 DIMENSIONS		
DATE: 10/22/07	REVISION: 1	SHEET: 1 OF 1


FIELD EQUIPMENT
ANALYZER SYSTEM
LEGEND
PRESSURE REGULATOR
VALVE
SOLENOID
3-WAY VALVE
FLOWMETER
FILTER
CONNECTION
ANALYZER VENT
H_2S DETECTOR
HUMIDIFIER
SAMPLE IN
SWEEP OUT
SEPARATOR (OPTIONAL)
TITLE
FLOW DIAGRAM
SIZE
A
DWG. NO.
1095-10280-2004
DATE
DRAWN
SHEET
1 OF 1

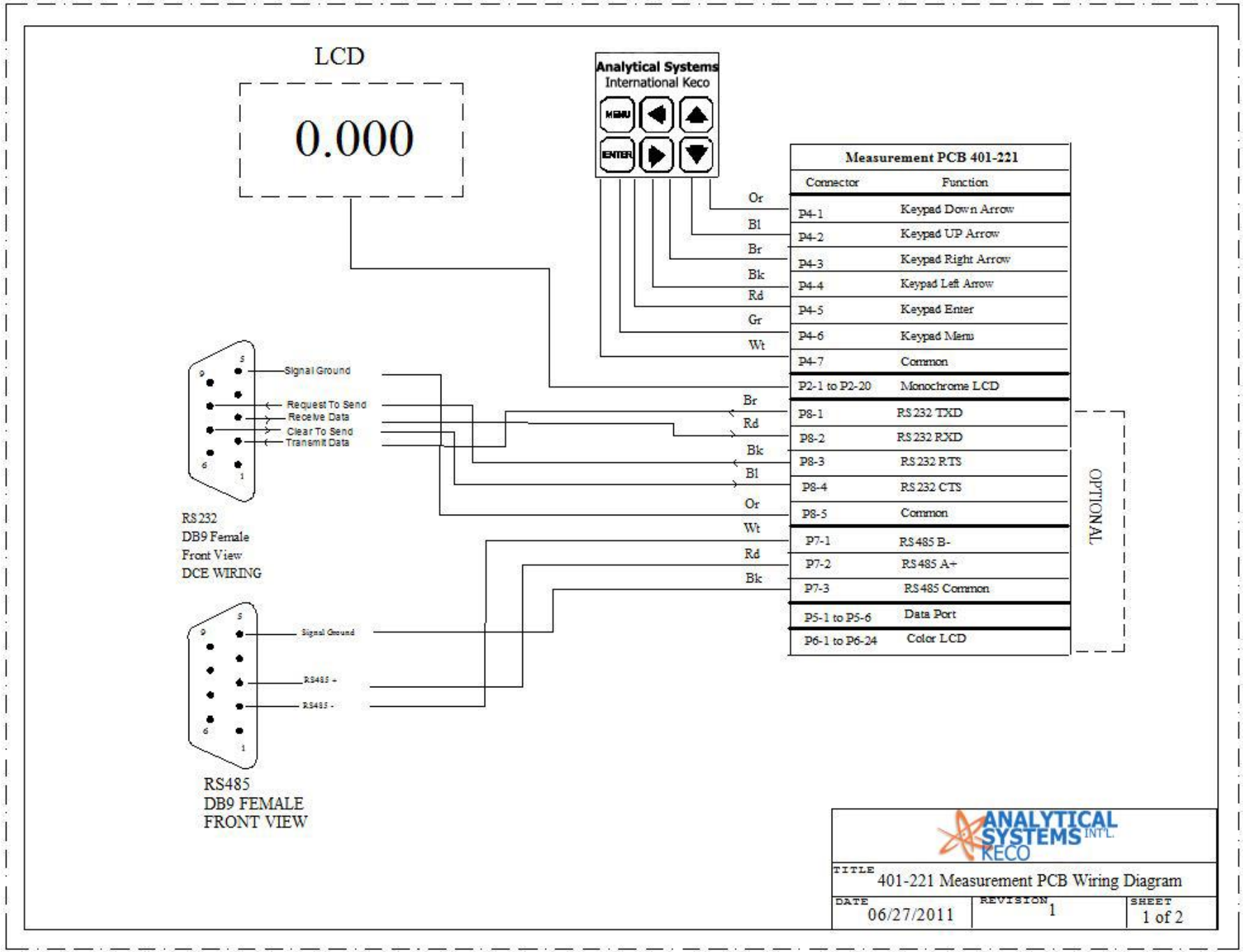

POWER
SWITCH
110/220 VAC
12/24 VDC
POWER
SUPPLY
+12VDC
Com
-12 VDC
Rd +24 VDC to Alarms
TAPE DECK PANEL
MOTOR
SENSOR
LED
Red
Bm
Bl
Bk
Wht
Grn
OUTPUT CONNECTIONS
Loop +
Loop -
Wt
Bk
Red
Bm
Bl
Bk
Wht
Grn
Bl
Bk
Control PCB 401-121
Connector
Function
P2-1
+12VDC
P2-3
Common
P4-1
Motor +12 VDC
P4-3
Motor Return
P6-4
Detector +mV
P6-7
Detector Return
P6-1
LED +3.3VDC
P6-2
LED Return
P3-3
Loop + (optional)
P3-4
Loop Return
P5-1 to P5-8
Contact Switch In
P5-9
Contact Common
P1-1 to P1-8
Loop Expansion (optional)
P7-1
2.5 VDC
P7-2
Flowmeter Signal
P7-3 to P7-4
A/D Aux
P7-5
Flowmeter +5VDC
P7-7
Common
J2-1
Contact Out +3.3VDC
J2-2 to J2-16
Contact Out Drive
NOTES
J2-2 TO J2-16 MAX 5VDC, SINK 0.005 A EACH
TO 401-422
OPTO ALARM
DRIVER
ANALYTICAL SYSTEMS INT'L.
KECO
TITLE
401-121 Control PCB Wiring Diagram
DATE
02/25/2010
REVISION
1
SHEET
1 of 2



■ DENOTES PIN 1

ANALYTICAL SYSTEMS INT'L. RECO

TITLE		
401-121 Control PCB Wiring Diagram		
DATE 02/25/2010	REVISION 1	SHEET 2 of 2


LCD
0.000
Analytical Systems
International Keco
MENU
ENTER
Measurement PCB 401-221
Connector
Function
P4-1 Keypad Down Arrow
P4-2 Keypad UP Arrow
P4-3 Keypad Right Arrow
P4-4 Keypad Left Arrow
P4-5 Keypad Enter
P4-6 Keypad Menu
P4-7 Common
P2-1 to P2-20 Monochrome LCD
P8-1 RS 232 TXD
P8-2 RS 232 RXD
P8-3 RS 232 RTS
P8-4 RS 232 CTS
P8-5 Common
P7-1 RS 485 B-
P7-2 RS 485 A+
P7-3 RS 485 Common
P5-1 to P5-6 Data Port
P6-1 to P6-24 Color LCD
OPTIONAL
Or
Bl
Br
Bk
Rd
Gr
Wt
Br
Rd
Bk
Bl
Or
Wt
Rd
Bk
Signal Ground
Request To Send
Receive Data
Clear To Send
Transmit Data
RS232
DB9 Female
Front View
DCE WIRING
Signal Ground
RS485 +
RS485 -
RS485
DB9 FEMALE
FRONT VIEW
ANALYTICAL SYSTEMS INT'L
KECO
TITLE
401-221 Measurement PCB Wiring Diagram
DATE
06/27/2011
REVISION
1
SHEET
1 of 2

Suggested Spare Parts

For one year's operation for 100-1200-1300 Series **ASI** Analyzers

Description	Part Number	
Pressure Block Assembly	1201-011	
Detector Block Assembly	1200-500	
Humidifier Assembly	1202-003	
Keypad	0435-001	
Pinch Roller Assembly	1206-001	
Tape Motor	1203-011	
Drive Belt	0234-100	
Flowmeter	0387-110	
Cabinet Heater (Optional)		
Power Module		
Display Module		
Pressure Gauge, 15 psig		
Relay Module (Optional for alarms)		
Flangeless Nut, black		
Flangeless, Ferrule		
Valve, 3-way ball		
Valve, Cut-off		
Valve, Solenoid (Optional for AutoCal)		
Humidifier Fill Plug Cap		
Electronics Assembly		
Sample Line Nut, 1/8"		
Terminal Blocks, Lge		
Tubing, 1/8" Teflon		
Sample Line Ferrule, 1/8"		
Sample Line Nut, 1/8"		

Options

The following page(s) provide descriptions and/or operating instructions for particular options that you have purchased on your **ASI** analyzer. If, at any time in the future, you choose to have additional options added to your analyzer by the **ASI** factory, the appropriate information/instruction pages for this manual will be provided.

The following options are available for **ASI** analyzers:

- Isolated 4-20mA Output Loop
- Diagnostic Alarm
- Concentration Alarms
- Low Tape Alarm
- Electronic Flowmeter with Alarm
- Data Communication
- iAnalyze
- Range Change
- Auto Calibration
- Chart Recorder
- Bottle Regulator
- Liquids Removal Filter
- Cabinet Heater
- Range Change