
MAINTENANCE AND TROUBLESHOOTING

The K Systems Inventory System should be a relatively maintenance-free inventory system, however, a basic knowledge of how the system works should prove beneficial in maintenance and trouble shooting problems should they arise.

There are essentially four major dynamic processes involved in arriving at the inventory value displayed on your primary inventory readout and/or communication to the main frame.

1. The sensing and transmission of tank product level
2. Transduction of the pneumatic signal to a voltage signal
3. The processing of the voltage to useable inventory values
4. Display and communication of inventory values

90% of all mechanical problems with incorrect inventory values originate from areas 1 and 2 whether pneumatic or electronic sensors are utilized with the K Systems inventory system. Through use of the VIEW SCREEN most problems can be isolated to either process 1,2 or 3.

1. Sensing and Transmission of tank product level

The pressure sensor, installed in each tank, produces an air pressure output proportional to the head pressure in the tank. The pneumatic diaphragm sensors are used in conjunction with a Sensor Control. A compressed air supply must be connected to the Sensor Control for operation of the pneumatic sensor. The 3-tube interconnecting cable between the sensor at the tank and the control unit must be leak-tight. **Even a slight leak at one of the tube fittings can affect the pneumatic output from the sensor.**

The pneumatic level sensing system is essentially a 1:1 transmitter which converts liquid head pressure to an air pressure. If there are 100 inches of product with a specific gravity of 1.00 above the sensor, then the pneumatic sensing system will produce essentially 100 inches of water column (W.C.) pressure or approximately 3.613 PSIG output. A product with a 2.00 Specific Gravity at 100 inches of depth above the sensor will produce 200 inches of water column or 7.226 PSIG output.

This pressure is transmitted to a P/E transducer which converts that signal to a 0 to 10 volt DC signal. The resulting voltage is then processed by the system computer to provide accurate information on the contents in the tanks.

(see PNEUMATIC LEVEL SENSOR TROUBLESHOOTING)

2. Transduction of pneumatic signals to 0-10 VDC

All transducers will drift in varying degrees from the original settings over a period of time and unlike standard process loop signals small variances in signal are significant when it comes to inventory. The pneumatic signals transmitted from the tank sensing units are connected to solenoids in the P/E rack. These solenoids are 3 - way normally open valves and under the normal operation, the air signal is transmitted through the solenoid to the P/E transducer in the rack. At pre-programmed intervals the solenoids are activated and the voltage measured so as to compensate for zero drift. Therefore, the majority of the time no adjustments need be made to the transducers. However, when the P/E transducers are suspect, the following procedure should be implemented.

- A. Connect a digital voltmeter to the + and - test lead of the transducer and take a voltage reading and record.
- B. Disconnect the incoming pneumatic signal tube from the solenoid. The voltage reading on the digital voltmeter should change from the pressurized reading to an atmospheric reading. Write down this reading.
- C. If the reading is in the positive range (.001 to .200 typical) the transducer is zeroed properly.

Disconnect voltmeter and look elsewhere for problem. If the transducer is reading in the negative range proceed to step D.
- D. The transducer needs zero adjustment. Disconnect the pneumatic tube from the solenoid. Write down the voltmeter reading of transducer output. Using a small screwdriver, adjust the zero output until the reading is approximately .100 volts by turning the "Z" (not "S") screw on the front of the transducer.
- E. Reconnect the pneumatic input line from the tank sensor control.
- F. Press "Reset" button on computer and observe zero voltage reading when solenoids are activated.
- G. Unplug digital voltmeter

Caution: Do not adjust span ("S") on the transducer unless an extremely accurate pressure standard is available.

3. The processing of the voltage signal to useable inventory values is done in the computer itself. The voltage signal output of the transducers is taken from the connections on top of the P/E rack through the circuit board and ribbon cable to the Computer Interface Board and then to the analog input boards (analog to digital - A to D) where it is converted to digital counts(0-4096 ATOD counts) and processed by the computer. The analog convertors operate from a -5.0VDC reference on the computer interface circuit board. This reference voltage should be checked occasionally and adjusted to -5.00 VDC if required. (See Computer I/O interface board illustration DS-120992int REV2.)

Very few problems occur in this portion of the system after initial startup of the system. However, should a problem be suspected check the cable connectors to be sure they are making proper contact. Any other suspected problems with the boards should be referred to K Systems Corporation.

4. Display, Communication, and Computer problems

The RS232 port (COM 1) transmits current product inventory data upon receiving a "send" signal from a peripheral device. Similarly upon receiving a character signal from the main frame computer the 5040C series system will accept a product specific gravity transmission.

Serial communication or display are typically symptomatic of a faulty cable connection, the computer program being either interrupted or diverted to a non-existing memory location or a faulty computer board. These symptoms appear as:

1. Screen stops scanning(Dial Scan Indicator Upper right corner of screen)
2. Clock stops
3. Error message appears on screen
4. Unrecognizeable characters appear on the screen
5. Non-existent communication or communication errors

These can occur for a multitude of reasons, however, typically a power outage or unclean power input to the system is the major cause. Should any of the above symptoms occur, turning off the computer at the computer power supply, check cable connections, and restarting the system will in most instances resolve the problem. In case of communication errors with the host PLC it may be necessary to reset the PLC serial communication module in addition to the K Systems unit. Call K systems Corporation or the supplier of the PLC package for assistance if you are unfamiliar with these procedures.

VIEW SCREEN

The View Screen is accessed through the computer **Keyboard** (not the keypad). The Keyboard may be left connected during normal operation of the system although it is not necessary.

By pressing the "V" key when in the normal run mode, the screen will change to display the following:



K Systems Corporation

TANK INVENTORY SYSTEM 5040C 10:24 AM



VER6.9 0 0

TANK	A/D	ZERO	VOLTS	SPGR	POUNDS	TANK	A/D	ZERO	VOLTS	SPGR	POUNDS
1	1254	47	0.114	1.234	847	21	47	47	0.114	1.134	163
2	47	47	0.114	1.234	847	22	47	47	0.114	1.134	163
3	24	24	0.114	1.234	847	23	47	47	0.114	1.076	1821
4	35	35	0.085	1.032	847	24	47	47	0.114	1.076	1821
5	36	36	0.088	1.032	416	25	47	47	0.114	1.076	1821
6	125	47	0.114	1.156	598	26	47	47	0.114	1.076	1821
7	45	45	0.110	1.156	567	27	47	47	0.114	1.058	117
8	45	45	0.110	1.056	537	28	47	47	0.114	1.058	117
9	698	25	0.061	1.029	681	29	47	47	0.114	1.058	117
10	47	47	0.114	1.115	537	30	47	47	0.114	1.234	106
11	42	42	0.103	1.201	681	31	47	47	0.114	1.234	106
12	42	42	0.103	1.121	681	32	47	47	0.114	1.234	254
13	2235	6	0.015	1.114	681						
14	3098	75	0.183	1.025	537						
15	1132	47	0.114	1.025	537						
16	47	57	0.139	1.025	204						
17	47	47	0.114	1.222	204						
18	47	47	0.114	1.222	598						
19	47	47	0.114	1.145	567						
20	47	47	0.114	1.145	1112						

- [M]- DISPLAY MA [A]- AUTOZERO CYCLE [Z]- ENTER ZERO VALUE
- [X]- EXIT VIEW [^T]- AUTO ZERO {ON}

(POS) - displays the screen position numbers of the tanks in order of screen presentation.

ATOD - displays the actual **Analog To Digital** counts being converted by the analog convertor for the pressure and voltage inputs presently being received from the tank sensor and P/E transducer.

ZERO - depicts the transmitter zero value currently being stored in memory.

VOLTS - should correspond to the voltage output reading of the P/E Transducer.

SPGR - product Specific Gravity programmed into the system.

Quantity - actual quantity of product based on SPGR and Sensor input data in units of measure displayed.

[M]- DISPLAY MA pressing the [M] key on the keyboard changes the voltage readout (VOLTS) to read in milliamps if the system contains 4-20 mA sensors or convertors.

[A]- AUTOZERO CYCLE pressing the [A] key on the keyboard produces an autozero cycle on the system

[Z]- ENTER ZERO VALUE pressing the [Z] key on the keyboard allows manual programming of an autozero value. This function is typically used in conjunction with 4-20mA tank sensors for which an automatic zeroing procedure cannot be preformed.

[X]- EXIT VIEW pressing the [X] key on the keyboard exits View Screen and returns the display to the normal "RUN" mode.

[^T] - AUTO ZERO {ON} pressing the [^] & [T] key SIMULTANEOUSLY on the keyboard TURNS OFF THE AUTO ZERO CYCLING of the system. This should be done only upon having problems with the operation of the autozero function on all tanks and only as a last resort.

The analog convertors operate from a -5 vdc reference on the computer interface circuit board. This reference voltage should be checked occasionally and adjusted to -5.00 VDC if required. (See Computer I/O interface board illustration DS-120992int REV2.)