Control Room

HMI (Human Machine Interface) touchscreen.

Wheel House

Ethernet Cable

Displays can be operated independently as 4 to 20 ma. scaled non-linear data will always be available to both systems after final tank calibration. This data will also be available at other nodes such as the Engineer's and Captain's staterooms.

Windows Based
Wheelhouse Computer

Analog to Digital Converters (A/D) are 16 bit devices

CPU							

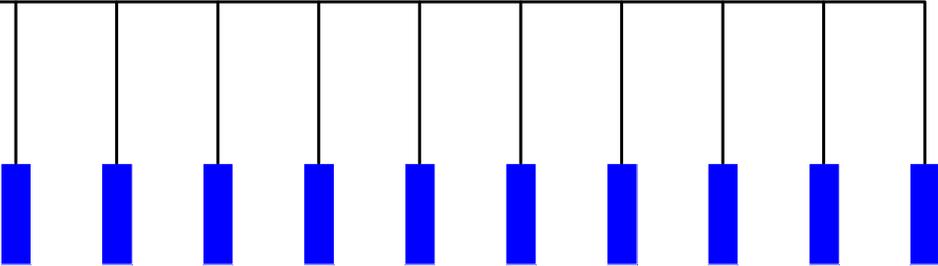**PLC and associated modules**
Engine Room/Control Room

4 to 20 ma. to
RS-232
Converter

Engine Room/Control Room

RS-232 to
Serial Server
Converter

Engine Room/Control Room

Existing Shipboard Ethernet Cable

System Accuracy

System accuracy depends on two factors:
1). The ability of the Analog to Digital Converters (A/D) to resolve the input from the sensors.
    (Expressed in bits)
2). The ability of the sensors to follow the pressure of the media (expressed in % of full scale).

A 16 bit A/D converter has the ability to resolve the input by 65,536 times (2 to the 16th power). The input range is 16 ma. (20 minus 4). Therefore, the system can see a difference of .00024 of 1 ma. This error is so small that it will never be seen and will not be considered an accuracy factor.
A 1% sensor is considered a high quality device. A 1% sensor's output would be within 10 gallons of a 1,000 tank. Our sensors are rated at .5% and therefore the output error for a 1,000 gallon tank would be 5 gallons. Any inaccuracies in sensors will be eliminated during tank calibration.

Sensor Types and Specs

Our preferred method of obtaining tank levels is using pressure sensors. The pressure applied to a sensor is directly proportional to the weight of the media which is proportional to the height of the media. Our sensors are configured as 4 to 20 ma. sensors. That is, with no pressure, the output is 4 ma. At full pressure range (1.5 PSI), the output would be 20 ma. or a 16 ma. span. This electrical configuration is an industry standard and was conceived to prevent noise from entering the system. Distance between the sensor and the PLC is not a factor in accuracy utilizing 4 to 20 ma. devices. For tanks mounted under the deck plates (only tops of the tanks are accessable) we use submersible sensors. For tanks that have accessable ports on the side we use standard external sensors. Sensor accuracy ratings vary from type to type but any inaccuracies are eliminated when the tank undergoes final dynamic calibration.

Tank Sensors

Integrated Fuel Management
1994 E. Sunrise Blvd. Ft. Lauderdale, Fl.
954/254-6370

Title:
PLC/Windows Based Tank Level Monitoring
Size: Number: Revision:
Date: Sheet   of
File: