

Engineering Bulletin

Bulletin No: EB-05-001

January 7, 2005

Equipment: Part No.: (1001270 and others as applicable)
Description: (Level Sensor Assembly)
Manufacturer: (BAE Systems)

Subsystem: Pedestal

PROBLEM

The level sensor output may oscillate up to (+-) 5 arcseconds at approximately a 2 hertz rate when used in power systems that have a floating neutral. This may cause inaccurate gravity slew measurements and higher than usual residuals. The floating neutral is causing low voltage AC power to be present on level sensor input to the Analog Multiplexer.

This problem has gone unobserved for many years because it is very subtle. It was not observed in our testing facilities because BAE Systems uses a grounded neutral in our test labs as required by U.S. National Electrical Code.

If it is believed that the radar has a grounded neutral system and the level sensor data has AC noise on it then verification of the grounded neutral will have to be accomplished. Please contact BAE Systems if you need assistance in verifying a grounded neutral system.

Radar systems with a grounded neutral that use generator power should also be tested using generator power to ensure the generator has a grounded neutral.

The computers sample rate is asynchronous to the prime power frequency (50 or 60 Hertz) and tends to filter out any AC present on the level sensor input. When the sample rate "rolls through" the peak of the AC noise there will be a DC bias applied to the level sensor input that can cause an inaccurate result at that point of the gravity slew routine.

BAE Systems produced many types of Level Meter Assemblies over the years. The 1001270 is our most popular one. Please contact BAE Systems if you are not sure if your particular Level Meter Assembly is affected by this problem.

Customers with DC powered Level Meter Assemblies may follow the procedures below with the exception that the measurements will be made on the external DC power supply. Please contact BAE Systems if assistance is required.

TEST PROCEDURES

The variable LEVL or the Analog Multiplexer word for the level sensor input can be observed on the Test Panel for excessive AC noise but this method is discouraged as the sample rate of the computer tends to filter the AC noise as discussed above.

The preferred methods to confirm AC noise on the level sensor data follows.

Warning

The following procedures require working on the pedestal. Ensure all safety precautions are followed.

Note

The following procedure should be done on a relatively windless day. When observing the Level Meter front panel meter no personnel should be on the pedestal. The level meter data is heavily filtered. The meter display should be observed for two to three minutes to ensure any oscillations are not due to the sensor damping actual pedestal movement.

- 1) Remove the pedestal cover to view the Level Meter Assembly.
- 2) With the Level Meter scale switch set to 100 arcseconds, observe the front panel meter. If the needle is moving back and forth around the current miss-level point at approximately a 2 hertz rate then proceed to step 3. If the needle is steady then no problem is indicated and the pedestal can be returned to operational status.

Warning

AC power exists within the Level Meter Assembly. If the radar power system has a floating neutral then AC power will also be present on the DC conductors. Use extreme caution when working inside Level Meter Assembly.

- 3) Remove the 4 screws from the front of the Level Meter.
- 4) The front panel is attached to the Level Sensor circuit board by wires. There should be enough service loop to let the front panel hang below the Level Meter Assembly. Ensure that none of the contacts on the front panel touches the pedestal. Use extreme caution as AC power may be present on the front panel contacts. Carefully remove the front panel.
- 5) Measure the resistance between the chassis lug next to J4 and the bare metal of the pedestal. Use extreme caution as there is AC power present on J4. The measured resistance should be less than 1 ohm. If it is proceed to step 6. If the resistance measurement is greater than 1 ohm then turn off power to the pedestal and troubleshoot the missing ground on P4-C of the cable going to the Level Sensor Assembly. When the missing ground is repaired proceed to step 6.

- 6) With an oscilloscope set to AC input, measure the + 15 volt DC on PS1. Ensure the oscilloscope probe ground is attached to pedestal chassis. The ground lug next to J4 can be used but used extreme caution as AC power is present on J4.

Do not use a digital Multimeter (DVM) for this measurement. Most DVMs' have a sample rate of 0.5 Hertz and it will filter any AC noise present on the +15 volt terminal.

If AC power greater than 200 millivolts is present on the + 15 volt terminal then a floating neutral is indicated. Typically the AC voltage will be two to three volts but the actual voltage will vary between systems. The AC noise will also be seen on the – 15 volt terminal of PS1 and the level sensor input on terminal 1 of the circuit board.

If AC power is present on the +15 volt terminal then proceed to next section.

If AC power is not present but the Level Sensor output is noisy then please contact BAE Systems for further instructions.

SOLUTION

- 1) Unplug P4 from the Level Meter Assembly. Connect a temporary jumper of 20 AWG or greater between the chassis lug next to J4 and PS1-T/C. Plug P4 back in and repeat step 6 of the procedure above. If the jumper solves the problem then fabricate a permanent jumper of 20 AWG or larger and install it between the chassis lug and PS1-T/C. If the jumper does not solve the problem then please contact BAE Systems for further instructions.

An updated 1001270 drawing that shows the jumper between the chassis and PS1 is available upon request.

The Level Meter Assembly may also be sent to BAE Systems for repair. Please contact our customer service representative for replacement information including price and delivery.

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