GEOQUIP

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The Leader in Perimeter Protection Solutions

GW4OOk SERIES
MAINTENANCE MANUAL

PROVEN PERIMETER PROTECTION

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1.1 GENERAL

This manual details the procedures for testing and verification of the major components of any security system employing GW400 series equipment. The purpose of the manual is to ensure that the **component** functionality is verified. This manual does not address the requirements of **performance** testing, since this topic is best carried out by the site user who may have specific performance test criteria to adhere to. Additionally, the need for **maintenance** of the perimeter barrier and ancillary equipment is not addressed in this manual since this subject is covered in detail in the appropriate installation and operation manuals for the equipment.

1.2 FREQUENCY OF TESTING

A fundamental aspect of any test schedule is that the frequency of testing should be appropriate to the degree of “wear and tear” to which the equipment is subjected.

GW400 series **electronic** equipment which has been installed and commissioned in accordance with the manufacturers recommendations must be tested at intervals not exceeding six months. GW400 series equipment to which this requirement applies includes the following list:

1. GW475 Analysers
2. GWJB Junction Boxes

3. GWGLK Gate Loop Kits

4. GWGBS Gate Bypass Switches

GW400k Sensor which is installed on structures which may move and flex under conditions of severe weather as well as being exposed to possible damage during attempted intrusions should be subject to testing at intervals not exceeding three months. Provided however that the sensor is inspected regularly for signs of damage and that the sensor installation requirements specified in the appropriate manual have been rigorously adhered to, the test interval may be extended to six months without detriment.

1.3 FREQUENCY OF TESTING - EXCEPTIONS

If, during an interval between tests, the system is exposed to unusual or extreme weather conditions, particularly including exposure to lightning strikes within 1 mile of the perimeter structure, additional testing must be implemented to verify the continued functionality of the system.

1.4 TEST DOCUMENTATION

To ensure a complete and continuous record of tests is maintained, it is necessary to fully document the results of each test in a logical and ordered fashion.

Sample test sheets for each component of the system are provided in Section 5 of this manual.

2.1 EQUIPMENT REQUIRED:

Flat blade terminal screw driver.

Flat blade medium screw driver.

Digital multimeter.

500 Volt insulation tester.

2.2 PRELIMINARY PRECAUTIONS

Prior to conducting any tests on a zone of GW400k Sensor, the following precautions should be taken.

1. Advise the site security personnel of the intention to carry out testing since the procedure will cause the analyser to signal continuous alarms when the sensor is disconnected.

2. Ensure that any gates that have a gate bypass switch are switched to “SECURE” mode of operation so that the tests will apply to the entire zone of sensor.

2.3 TEST PROCEDURE

1. Remove the lid of the analyser housing and fasten down the tamper microswitch with a piece of adhesive tape or a small tiewrap. Identify the sensor terminal block on the analyser PCB i.e. the left hand, four way, block marked J4. See Figure 1.

2. Disconnect the four wires from this terminal block and also the earth wire from the 6mm ground stub

on the bottom end of the box. Identify the following colours for each wire:

Red

Black

Yellow

Blue

Green/yellow

3. Set the multimeter to read resistance on the 200Ω range. Measure the resistance of the loop formed by the red and yellow wires and note the value on the sensor test sheet.

4. With the multimeter on the same range, measure the resistance of the loop formed by the black and blue wires and note the value on the sensor test sheet.

5. Compare the resistance readings noted in steps 3 and 4 above. In a properly terminated sensor the difference between the two readings should be less than 5%.

6. The sensor length can be estimated from the above resistance readings using the formula shown below.

$$\text{Length in metres} = \frac{\text{Average loop resistance}}{16} \times 100$$

or

$$\text{Length in feet} = \frac{\text{Average loop resistance}}{5} \times 100$$

N.B. The Loop Resistance must be entered in Ohms. Note the sensor length on the Sensor test sheet.

7. Set the multimeter to the 2kΩ range and measure the resistance value obtained between the red and black wires. Note this value on the sensor test sheet. The value obtained in this step should be 1kΩ plus the reading obtained in either steps 3 or 4 above.

8. Set the multimeter to the 2000kΩ resistance range and check that the resistance between the Green/Yellow earth wire and the Yellow wire is greater than 1MΩ. Note the value obtained on the test sheet.

9. Repeat this test to verify no leakage between the Green/ Yellow wire and the Blue wire, again this reading should be greater than 1MΩ. Note the value obtained on the test sheet.

10. Using the 500 volt insulation tester, verify that any leakage between the green/yellow wire and the metallic structure of the fence exceeds 5MΩ. Note the value obtained on the sensor test sheet.

11. At the end of line termination box disconnect the red and the yellow/green wires from the terminal

block and short together. Set the multimeter to the 200Ω range and check the resistance between the red and the yellow/green wires at the analyser. The resistance obtained should be 21.2Ω for every 100m of sensor using the length calculated in step 6. After testing reconnect the wires to the end-of-line terminal block.

If proceeding to test the analyser as detailed in the next section leave the sensor disconnected from the analyser terminal block.

If analyser testing is not to be done at this stage reconnect the sensor tails to the terminal block/ground stud in the analyser ensuring that the colour of the wires match the colours printed on the PCB. Remove the restraint from the tamper microswitch. Verify that on depressing the microswitch, after a short period of time, both “Alarm” and “Tamper” LEDs turn on. Replace the analyser lid.

2.4 CONCLUSION OF TESTING

On completion of the testing phase, a comparison can be made between the results obtained during the tests with those obtained on the previous tests or during the commissioning procedure for the system. In general, it can be assumed that if resistance readings are **lower** than previously noted, or if the levels fluctuate significantly depending on the weather conditions at the time of the test, moisture has penetrated the sensor and is affecting the values obtained.

If this is found to be the case, corrective actions as detailed in the fault finding section of the installation manual is required.

3.1 EQUIPMENT REQUIRED:

Digital Multimeter.

Flat blade medium screw driver.

Flat blade terminal screw driver.

Two wire links and a 1kΩ resistor.

GWAMP-1 audio amplifier.

3.2 PRELIMINARY PRECAUTIONS

1. Advise site security personnel of the intention to carry out testing of the GW475 analyser since the procedure will require disconnection from the annunciator system with subsequent alarm indication.

2. If not already done so following sensor testing, remove the lid of the analyser housing and fasten down the tamper microswitch with a piece of adhesive tape or a small tiewrap.

3. Note the settings of the analyser control switches.

3.3 TEST PROCEDURE

1. Set the switches to the following positions:

   CH.A. sensitivity = 5
   CH.B. sensitivity = 5
   EVENTS control = 1
   TIMER control = 1

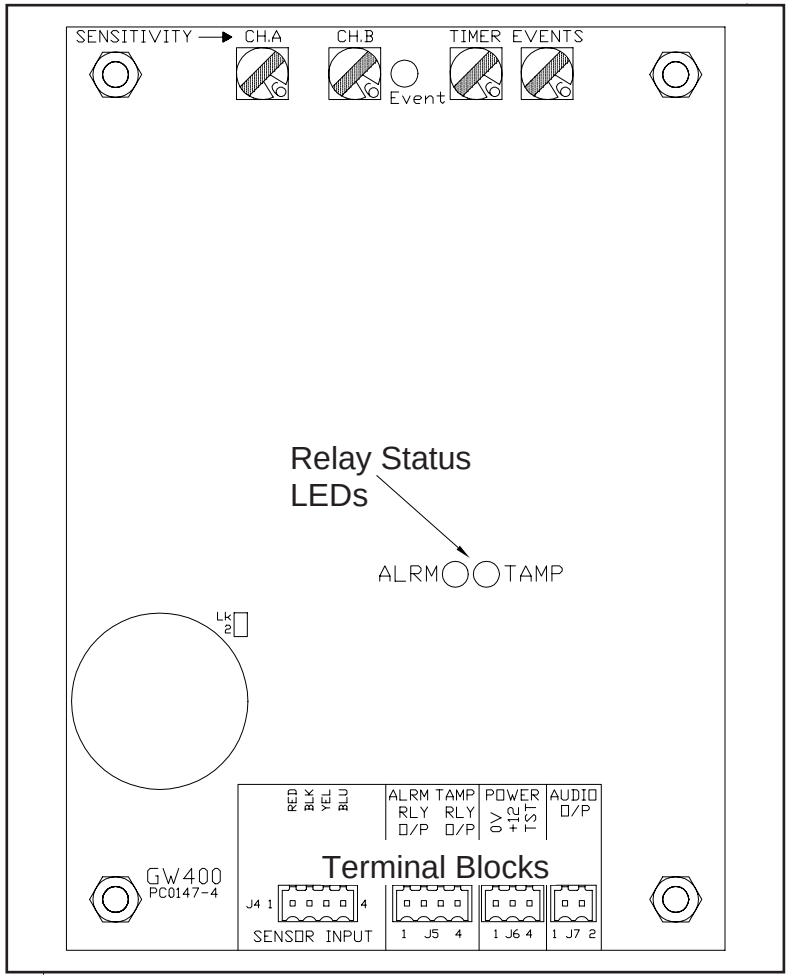

Figure 1

2. If not already done so, remove the sensor from the analyser PCB by disconnecting the four wires from the left hand, four way terminal block labelled J4

and also the earth wire from the 6mm ground stub on the bottom end of the box. See Figure 1.

3. Install a wire link between positions 1 and 3 of the sensor terminal block.

4. Install the other wire link between positions 2 and 4 of the sensor terminal block. Ensure that the two links do not touch each other.

5. Install the 1kΩ resistor between positions 1 and 2 of the sensor terminal block. See Figure 2.

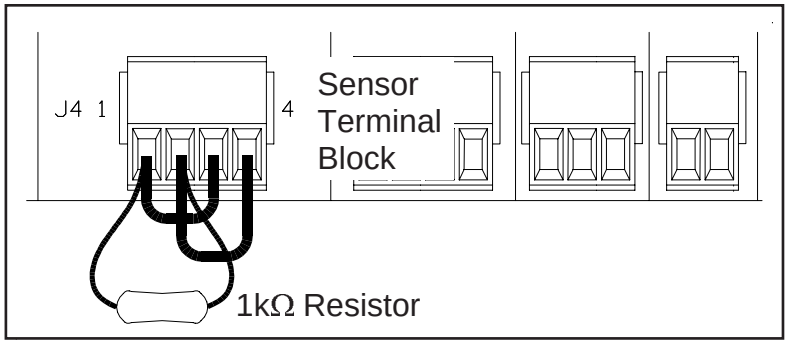

Figure 2

6. Set the multimeter to the 20V dc range and measure the dc supply voltage to the analyser PCB. The power terminal block is the only three way block on the PCB and the power input is connected to the two left hand terminals of this. The middle terminal should be +12 V while left hand one should be 0V (zero). The dc supply voltage should be within the range 10.8 - 13.2 V dc. Note the value obtained on the analyser test sheet.

7. Disconnect the wire from middle terminal (+12V) and ensure that it does not come into contact with the metalwork of the case or any other wires.

8. Set the multimeter to read dc current on the 200mA range.

9. Connect the positive terminal of the multimeter to the wire removed in step 7 previously and the negative terminal of the multimeter to the middle terminal of the power terminal block. The normal current consumption of the GW475 analyser should be 100mA $\pm$ 10%. Note the reading obtained on the analyser test sheet. Reconnect the +12V wire to the middle terminal of the power terminal block.

10. Verify that both the “Alrm” and the “Tamp” LEDs are illuminated. Note this fact on the analyser test sheet.

11. Identify the relay output terminal block i.e. the four way block labelled J5. Set the multimeter to the 200Ω resistance range and verify that both the “Alarm” and the “Tamper” relays are in the closed state by measuring the resistance reading between the two left hand terminals (Alarm relay) and the two right hand terminals (Tamper relay). In both cases the resistance readings should be virtually 0 (zero). Note these facts on the analyser test sheet.

12. Set the “Events” control to position 0 (zero). Verify that the “Alarm” relay contacts open by measuring the resistance between the alarm relay terminals.

Note this fact on the analyser test sheet and re-set the “Events” control switch to position 1.

13. Remove the fastening on the tamper switch on the analyser PCB and release the switch lever. Note that the “Tamper” relay contacts open by measuring the resistance between the tamper relay terminals. Note this fact on the analyser test sheet and then replace the tamper switch fastening.

14. Disconnect one end of either of the two jumper links installed in steps 3 or 4. Again verify that the “Tamper” relay operates by following the procedure detailed in the previous step. Replace the jumper link and note this fact on the analyser test sheet.

15. Temporarily short-circuit the 1kΩ resister and verify that the “Tamper” relay operates by measuring the resistance reading as described before. Note this fact on the analyser test sheet. Remove the short circuit.

16. Set the multimeter to the 20V dc range and measure the dc voltage between the two left hand terminals of the sensor terminal block. This voltage should be 2.4V dc ± 10%. Note the reading on the analyser test sheet.

17. Using the GWAMP-1 connected to two way audio terminal block, monitor the audio output of the analyser and verify that the output is quiet and exhibits no spurious tones or other noises. Note this fact on the analyser test sheet. Leave the GWAMP-1 connected at this stage.

18. Operate the analyser “self-test” facility by connecting a jumper link between the two outside terminals of the power terminal block. Observe the “Alarm” relay LED and note that it turns off after one short burst of audio has sounded through the GWAMP-1 amplifier unit.

19. Return the analyser control switch settings to the positions noted earlier.

20. Remove the wire links and resistor from the sensor input and also the “self-test” wire link. Reconnect the sensor tails to the sensor terminal block/ground stud in the analyser ensuring that the colour of the wires match the colours printed on the PCB. Remove the restraint from the tamper microswitch. Verify that on depressing the microswitch, after a short period of time, both “Alarm” and “Tamper” LEDs turn on. Replace the analyser lid.

This concludes the analyser test procedure. Should any of the measured values or observed conditions be significantly different to those recorded previously, contact Geoquip Limited for further advice.

4.1 EQUIPMENT REQUIRED:

Flat blade terminal screw driver.

Flat blade medium screw driver.

Digital Multimeter.

4.2 PRELIMINARY PRECAUTIONS

1. Advise site security personnel of the intention to test these components since the test procedure will require disconnection of the sensor to these units. This will cause the analyser unit on that zone to signal continuous alarm conditions.

2. It is not recommended that these tests be carried out in conditions of inclement weather since such conditions may result in unacceptable levels of moisture entering the enclosures of these units.

4.3 GENERAL

The test procedures indicated below are designed simply to test the operation of the tamper microswitches within the boxes of the following units:

GWJB

GWGLK

GWELT

GWGBS

Any other faults which may develop in these units would be shown up by the procedures outlined for testing the sensor.

4.4 TEST PROCEDURE - GWJB

1. Remove the lid of the box and remove both sensor tails connected to the Red terminals of the terminal blocks within the unit.

2. Fasten down the tamper microswitch with adhesive tape or similar fixing.

3. Set the multimeter to the 200Ω range and verify that the resistance reading obtained when measuring between the RED terminals is virtually 0Ω (zero). Note this result on the test sheet.

4. Remove the adhesive tape from the tamper microswitch and release the microswitch lever. Verify that the multimeter indicates an open-circuit condition. Operate the tamper microswitch lever at least five or six times and verify that the multimeter reading changes from an open-circuit condition to a short-circuit condition. Note the results on the test sheet.

5. Reconnect the Red conductors from the sensor back into the junction box terminals and replace the lid of the unit securely.

4.5 TEST PROCEDURE - GWGLK

The tests to be carried out on the GWGLK boxes are identical to those listed for the GWJB unit described previously. Each box is to be tested individually in accordance with the previous set of instructions and the results noted on the appropriate test sheet.

4.6 TEST PROCEDURE - GWELT

1. Remove the lid of the unit and disconnect the sensor cable wires from the terminal block.

2. Set the multimeter to the 2kΩ range and attach the test leads of the multimeter to the Red and Blue terminals of the unit.

3. Note that initially, the meter reads an open-circuit condition, and then depress the microswitch lever. Note that the reading on the multimeter changes to 1kΩ. Record this result on the test sheet.

4. Reconnect the sensor cable leads to the terminal block and replace the lid of the unit.

4.7 TEST PROCEDURE - GWGBS-A/C

1. Remove the lid of the unit and disconnect the Blue wires connected to the terminal blocks marked "To Processor" and "To End Of Line".

2. Set the multimeter to the 200Ω range and connect the test leads to each of the Blue terminals from which the sensor cable wires have been removed. Note that initially, the multimeter reads an open-

circuit condition, and then depress the microswitch lever. Note that the reading changes from an open-circuit condition to a virtual short-circuit condition. Note this result on the test sheet.

4.8 TEST PROCEDURE - GWGBS -B/D

1. Remove the lid of the unit and disconnect the Red wires connected to the terminal blocks marked "To Processor" and "To End Of Line".

2. Set the multimeter to the 200Ω range and connect the test leads to each of the Red terminals from which the sensor cable wires have been removed. Note that initially, the multimeter reads an open-circuit condition, and then depress the microswitch lever. Note that the reading changes from an open-circuit condition to a virtual short-circuit condition. Note this result on the test sheet.

Sensor Cable Test Sheet

Date of test: Sheet No:

Tested by: Signed:

Test Results

Resistance between Red and Yellow wires:	Ω
Resistance between Black and Blue wires:	Ω
Loop resistances of tests 1 and 2 within limits (ie ± 5%)	Y/N
Cable length:	m
Resistance between Red and Black wires:	Ω
Resistance between Green/Yellow and Yellow wires: (>1MΩ)	MΩ
Resistance between Green/Yellow and Blue wires: (>1MΩ)	MΩ
Resistance between Red and Yellow/Green wires:	Ω
Leakage value between fence and Green/Yellow wire: (>5MΩ)	MΩ

GW475 Analyser Test Sheet

Date of test: Sheet No:

Tested by: Signed:

Test Results

Initial Control Settings	Channel A: Channel B: Events: Timer:
dc Supply voltage (10.2 - 13.8V dc)	V
dc Supply current (100mA ±10%)	mA
'Alrm' and 'Tamp' LEDs on?	Y/N
'Alarm' relay contact resistance Terminals 6 and 7	Ω
'Tamper' relay contact resistance Terminals 8 and 9	Ω
'Alarm' relay opens? Terminals 6 and 7 (Test 12)	Y/N
'Tamper' relay opens? Terminals 8 and 9 (Test 13)	Y/N
'Tamper' relay opens? Terminals 8 and 9 (Test 14)	Y/N
'Tamper' relay opens? Terminals 8 and 9 (Test 15)	Y/N
dc voltage level Terminals 1 and 2 (2.4V dc ± 10%)	V
Audio output clear ? (Test 17)	Y/N
Self-test operational ? (Test 18)	Y/N

GW400 Series Accessory Test Sheet

Date of test: Sheet No:

Tested by: Signed:

Test Results

GWJB

Resistance between red terminals (Microswitch down) : Ω

Resistance between red terminals (Microswitch up) : Ω

GWGLK

Resistance between red terminals - Box 1 (Microswitch down) : Ω

Resistance between red terminals - Box 1 (Microswitch up) : Ω

Resistance between red terminals - Box 2 (Microswitch down) : Ω

Resistance between red terminals - Box 2 (Microswitch up) : Ω

GWELT

Resistance between red and blue terminals (Microswitch up) : Ω

Resistance between red and blue terminals (Microswitch down) : Ω

GWGBS (terminal colour depends on switch type)

Resistance between blue/red terminals (Microswitch up) : Ω

Resistance between blue/red terminals (Microswitch down) : Ω