Marine Approvals and Testing Service
Type Test/Inspection Certificate
RTCM SC110 EPIRB V2, Section 15

QinetiQ

FRASER, PORTSMOUTH PO4 9LJ

Date of Issue: 31st January 2002 **Cert. No.:** NTT-11/01-C01

Equipment under Test.	Date EUT Received: 16-11-01 Date of Test: 22-11-01		
Manufacturer:	JOTRON ELECTRONIC AS		
Address:	P.O. Box 54, N-3280		
	Tjodalyng, NORWAY		
Units Comprising " Equipment's under Test "			
	Description	Type Number	Remarks
1	EPIRB Beacon	TRON 40GPS	S/N OLA 00035
2	C/w Battery Pack	X-97780	Class 2

<u>Representative System / Configuration Notes</u>
The objective was to verify compliance with the Buoyancy requirements of section A15.0. In particular to prove that the Tron 40GPS does meet the excess buoyancy requirement.

A beacon of the same type and build has been subject to all of the tests required by the RTCM Document SC110 EPIRB Version 2 at the Interspace test Lab in France.
Unfortunately the tests for buoyancy (section A15.0) had seemingly been carried out incorrectly or with a flawed test method or analysis, and the results were either inconclusive or indicated failure.

This report details the conduct of this test using the standard accredited test method used at QinetiQ, Fraser Range and additionally repeats the test using two alternative test methods to confirm the result gained. A series of photographs to record the nature of each test method is provided as an Annex.

TEST PROCEDURES (see Annex A, Photographs)

Preconditioning:
The beacon was examine and subjected to an "aliveness" test (test A11) to confirm that the sample under test was representative of the type and fully operational before testing commenced. This was conducted in an anechoic screened room. (Photo 1)
Because the beacon was not coded with "test" protocol the sea water switch contacts were covered with plastic tape to prevent any inadvertent activation and distress transmissions.

Result: It was confirmed the TRON 40GPS Beacon was a standard production unit and that it passed the aliveness test.

The weighing scales were calibrated using the set of class F1 test weights in accordance with Work Instruction for weighing machines. They were confirmed to be within ±4 grams.

Test Procedure 1. (This is the standard accredited test method in the QinetiQ Lab)

This is essentially A15, method 1 from the RTCM standard. The EPIRB Beacon was placed on the platform of the weighing machine and the dry weight of the beacon was recorded from the digital readout.
The EPIRB Beacon was then fitted with lightweight harness to enable it to be pulled under the water surface. This was connected by nylon cord through a small pulley fixed to the bottom of the test tank and then up out of the water and there connected to the weighing scales. The scales were positioned on the platform of a hydraulic lifting device.
The beacon was allowed to float naturally on the water in the test tank. See Photo 2.

The platform of the Hydraulic lift was raised slightly to take the slack out of the connecting cord but without introducing any tension. The weighing scales were zeroed with the Tare control.
The platform of the Hydraulic lift was then raised steadily until the beacon was just submerged. See Photo 3.

The reading on the digital readout of the weighing scale was recorded.

Results: Dry weight of beacon (mass) 2016 grams

Force needed to submerge beacon 883 grams
When the beacon is floating naturally it is supporting its own mass by the displacement of water, the force needed to submerge the beacon from this position is a measure of excess buoyancy.

∴ total buoyant force = 2016 + 883 = 2899 grams
excess buoyancy factor = (2899 / 2016) = 1.438

Test Procedure 2. (Volume ratio)
This is essentially A15, method 2 from the RTCM standard. Practical designs of EPIRB beacons are complex shapes that do not readily allow calculation of the volume above and below the waterline. This method measures the volume by a practical procedure.

The test tank is fitted with an overflow pipe
The test tank was filled with water until water flows from the overflow the tank is then left to enable the water level to normalise so that no further drips emerge from the overflow pipe.
The EPIRB Beacon was then gently introduced into the test tank and allowed to float naturally on the water. The overflowing water from the overflow pipe was collected in a glass measuring flask. The water level was given sufficient time to allow it to normalise so that no further drips emerge from the overflow pipe. See Photo 4.
The volume of water collected in the measuring flask was recorded this would represent the volume below the waterline.

The measuring flask was emptied and replaced under the overflow pipe
Then using controlled finger pressure on the top of the beacon it was lowered into the test tank such that it was just submerged. Again the water level was given sufficient time to allow it to normalise so that no further drips emerge from the overflow pipe. See Photo 4.

The volume of water collected in the measuring flask was recorded, this would represent the volume above the waterline.

Results:	Volume below waterline	2065 millilitres.
	Volume above waterline	895 millilitres.

The volume below the waterline represents the displacement of water needed to support the mass of the beacon, the volume above the waterline represents a potential displacement that could support an excess mass.
The excess buoyancy factor is a ratio of the total volume divided by the volume needed to support the mass of the beacon.

∴ total volume of beacon = 2065 + 895 = 2960 millilitres
excess buoyancy factor = (2960 / 2065) = 1.433

Test Procedure 3. (Archimedes' Principle – displaced water weight)
This procedure is similar to the above procedure 2 except that a container placed on the weighing scale replaces the measuring flask.

The test tank was filled with water until water flows from the overflow pipe into the container. The tank is then left to enable the water level to normalise so that no further drips emerge from the overflow pipe. The tare control on the weighing scale is then operated to zero the scale.
The EPIRB Beacon was then gently introduced into the test tank and allowed to float naturally on the water. The overflowing water from the overflow pipe goes into the container. The water level was given sufficient time to allow it to normalise so that no further drips emerge from the overflow pipe. See Photo 5.
The weight of the water collected is then read from the scale and recorded. According to Archimedes' principle this weight of the displaced water is equal the mass (weight) of the body (beacon) displacing the water.

Then using controlled finger pressure on the top of the beacon it was lowered into the test tank such that it was just submerged. Again the water level was given sufficient time to allow it to normalise so that no further drips emerge from the overflow pipe. See Photo 5.
The total weight of water now in the container was then read from the scale and recorded.

Results:	Weight of displaced water (naturally floating)	2085 grams.
	Weight of displaced water (totally immersed)	2996 grams.

The excess buoyancy factor is a ratio of the totally immersed displacement divided by the beacon naturally floating displacement.

∴ total immersed displacement =2996 grams
floating beacon displacement =2085 grams
excess buoyancy factor = (2996 / 2085) = 1.437

Post tests
The beacon was examined and subjected to an "aliveness" test (test A11) to confirm that the sample was still operational and no degradation had occurred.

Result: it was confirmed the TRON 40GPS Beacon passed the aliveness test and there were no visible signs of degradation.

Comment:

The results of all three, test procedures were consistent in proving that the TRON 40GPS EPIRB Beacon had some 40% excess buoyancy. The minor differences between each test were within the expected measurement uncertainty.

The RTCM SC110, V2 Standard, Clause A15 requirement for an excess buoyancy factor of 1.05 or greater has been met.

Officer Supervising Testing: P J Goddard Signed..........................

Test: Manager R A Sharp Signed..........................

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Annex A, Photograph 1.

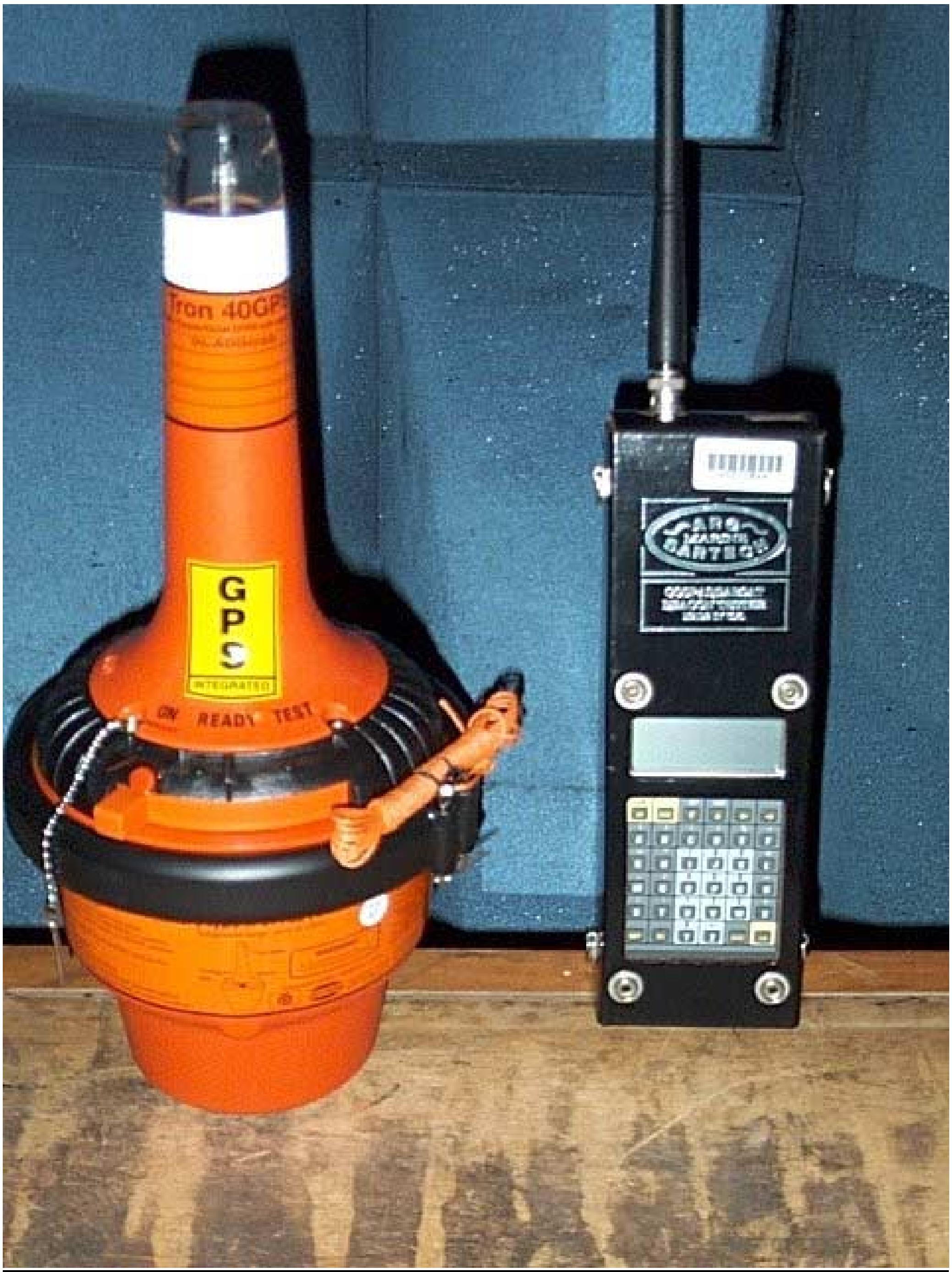

Photo 1. The TRON 40GPS Beacon and the ARG/Sartech EPIRB Tester.

Annex A, Photograph 2.

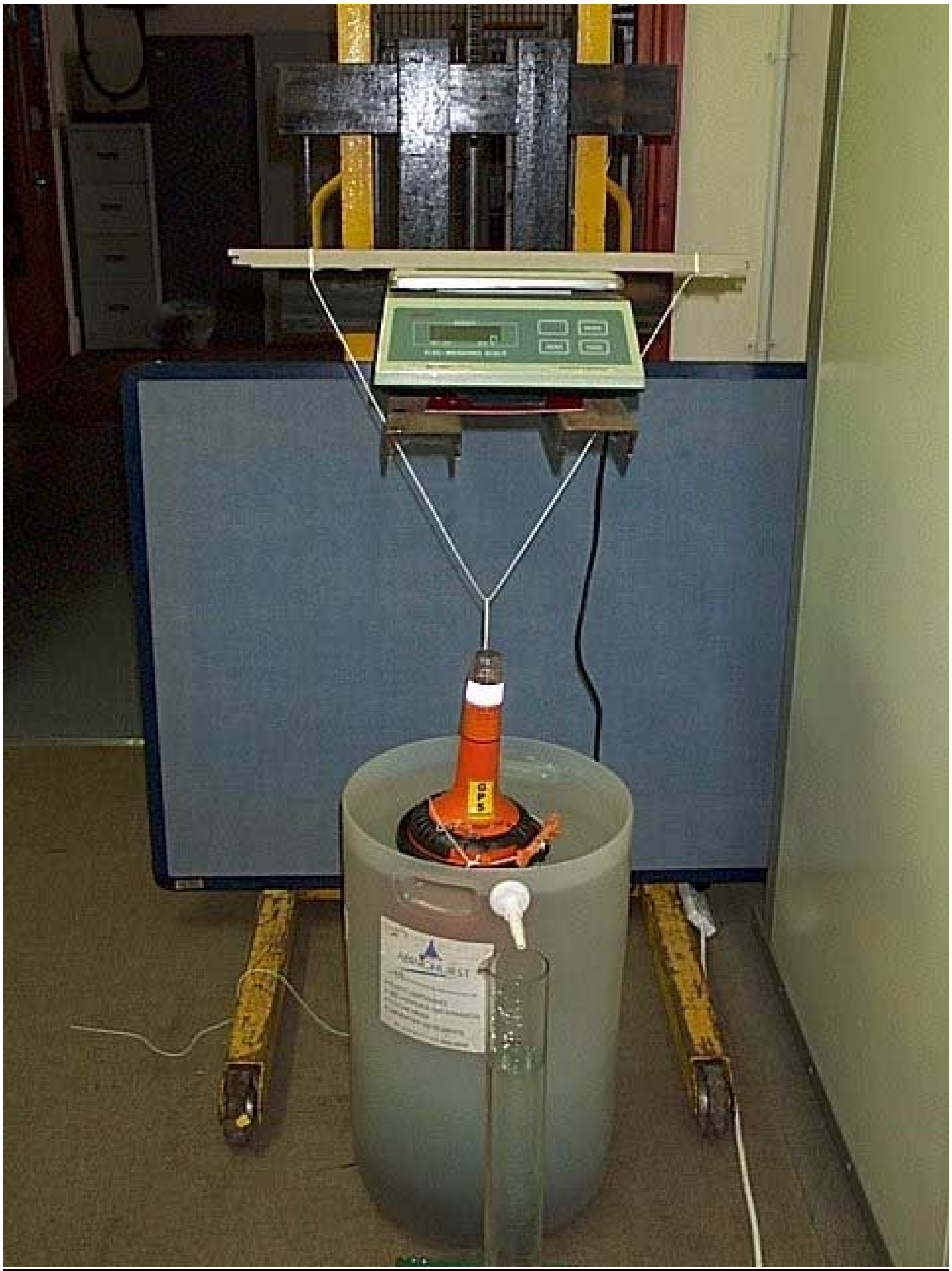

Photo 2. The set-up for testing procedure 1 – Beacon floating naturally.

(note: a pull-force scale was not available so a platform scale with a yoke arrangement was used)

Annex A, Photograph 3.

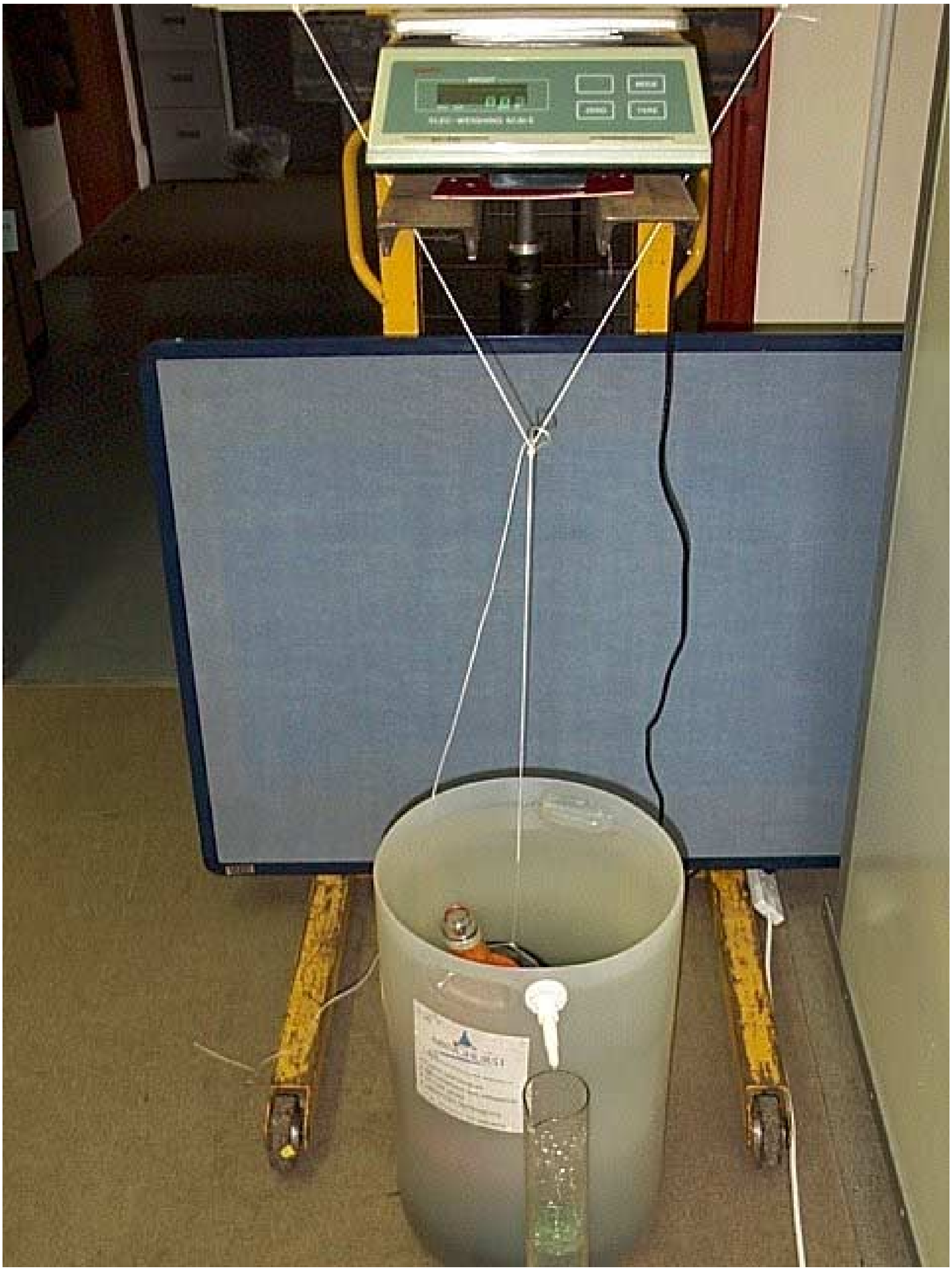

Photo 3. Scale lift raised to submerge beacon.

Annex A, Photograph 4.

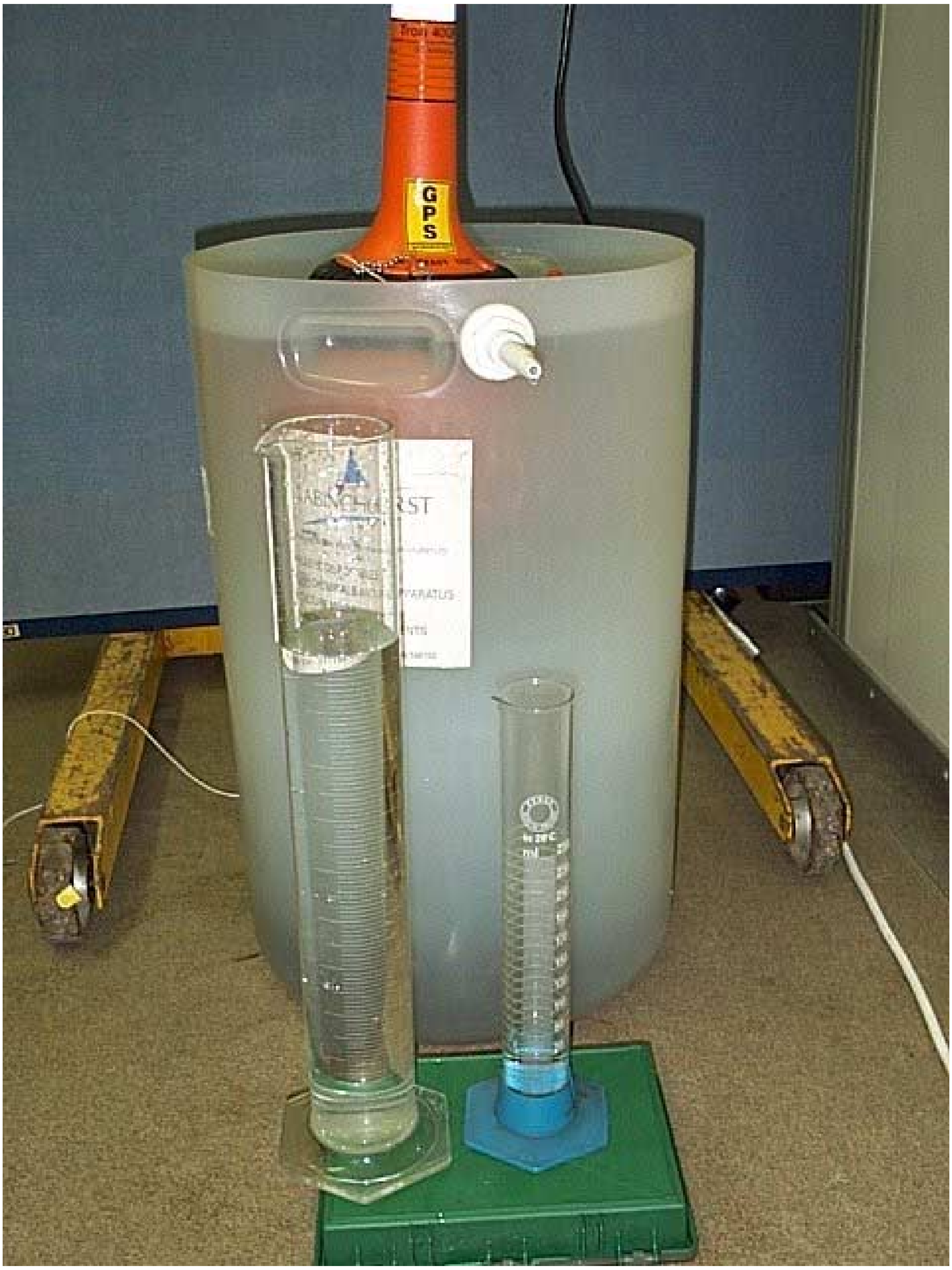

Photo 4. The set-up for testing procedure 2 – Beacon floating naturally.

Annex A, Photograph 5.

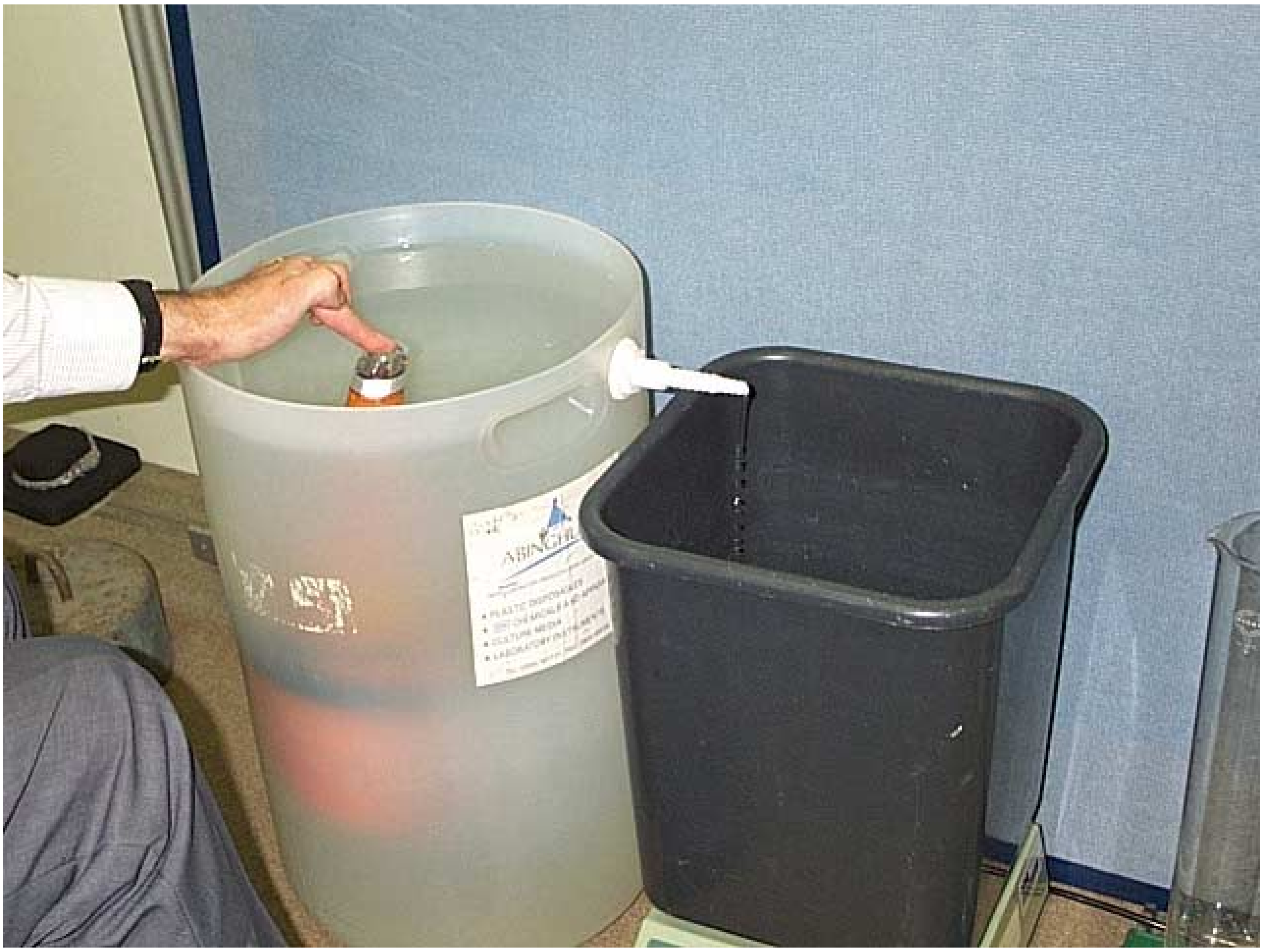

Photo 5. The set-up for testing procedure 3 – Beacon submerged.