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UNITED KINGDOM ATOMIC ENERGY AUTHORITY

ATOMIC WEAPONS RESEARCH ESTABLISHMENT

REPORT No. T 29/57

OPERATION BUFFALO

WEAPON ASSEMBLY

G. GALLIE.

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United Kingdom Atomic Energy Authority

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Weapon Assembly

G. Gallie

Received on 29th April, 1957

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DNO WHG
Classification Lead
8 Apr 2026

Table of Contents

		Page
1.	Introduction	3
2.	Details of the Weapons	3
	2.1 Live Weapons	3
	2.2 Practice Weapons	4
3.	Transport of the Weapons	4
4.	Weapon Assembly	5
5.	Tamper Trials	6
6.	Inspection	7

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DNO WHG
Classification Lead
8 Apr 2026

1. Introduction

The Firing Programme for Operation Buffalo included two experimental bombs fired on towers, one experimental atom bomb fired in a pit with its centre level with the surface of the ground and one bomb, similar in all respects to the [redacted], except that the fissile core was arranged for a reduced yield and was suspended on a special gauntlet. This bomb was an airburst weapon, released from a Valiant aircraft. It was handed over to the RAF and treated by them in precisely the way a Service weapon would be treated. To assist the RAF to prepare for this operation six practice weapons were made available, one concrete filled and five HE filled. Of the five, one was fitted with a dummy of the reduced fissile core and the special gauntlet used in the live weapon.

2. Details of the Weapons

2.1 Live Weapons

Details of the weapons actually fired are given below.

A1 was fired on a tower at "One Tree" at 17.00 hours (local), 27th September, 1956. It consisted of [redacted].

A2 was fired on a tower at "Breakaway" at 00.05 hours (local) on 22nd October, 1956. It consisted of [redacted].

A3 was fired in a pit, with the centre of store in the plane of the earth's surface, at 16.30 hours (local) on 4th October, 1956. It consisted of a [redacted]

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DNO WHG
Classification Lead
8 Apr 2026

[redacted]

A4a was dropped from an RAF Valiant bomber at 15.30 hours (local) on 11th October, 1956. It consisted of [redacted]

2.2 Practice Weapons

Prior to dropping A4a the RAF dropped three of the six practice rounds; one concrete filled round for test of telemetry was dropped on 4th September, 1956, [redacted] A4c2 and A4c3, were dropped on 29th September, 1956. For these the RAF drill was precisely as for a Service round and the cartridges with dummy fissile cores were automatically loaded into the weapons by the aircraft's in-flight loading mechanism. The whole performance was so smooth and the bomb-aiming so accurate that the RAF Task Force Commander decided not to use the remaining three practice rounds.

3. Transport of the Weapons

Transport to Australia took place as follows:-

A1 was completely assembled in AWRE around a dummy fissile core and was flown to Australia by RAF Transport Command on 15th July, 1956. The fissile core was flown by RAF Transport Command on 1st August.

A2 was also assembled in AWRE round a dummy fissile core and was flown to Australia on 7th September. The fissile core was sent on 1st September, again by Transport Command.

A3 The centre-section framework, the flask, the high explosive, the cartridge and spare cartridge were shipped from the United Kingdom in S.S. PORT ADELAIDE, leaving London on 12th May. The fissile core and gauntlet left AWRE on 17th August and were flown by RAF Transport Command.

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DNO WHG
Classification Lead
8 Apr 2026

A4a The centre-section framework and the high explosive were shipped in S.S. PORT ADELAIDE. The flask, the cartridge, a spare cartridge, the gauntlets and the fissile core left AWRE on 15th September and were flown by RAF Transport Command.

A4c2 and A4c3. These weapons, which had been completely assembled by the ROF, Burghfield, were sent by sea in S.S. PORT ADELAIDE. Whilst A1 and A2 could obviously not be sent assembled around their fissile cores, cartridge-loaded A3 and A4a might well have been. Administrative difficulties concerning [redacted] compelled us to send the flask of A3 separate from the HE but in the same ship. The flask of A4a was not made in time to go by sea.

4. Weapon Assembly

Assembly of the weapons was carried out in Buildings XA1.1 and XA1.2 at Maralinga as follows:-

A1 The assembly was stripped, the dummy core removed and the fissile core, supplied as required by the RA Assembly Group, inserted. The complete bomb, less firing unit and exploders, was transported in a trailer behind a motor truck from XA1.1 to "One Tree".

A2 The assembly was stripped, the dummy core removed and the fissile core, supplied as required by the RA Assembly Group, inserted. The complete bomb, less firing unit and exploders, was transported in a trailer behind a motor truck from XA1.1 to "Breakaway".

Cartage of these two bombs with fissile cores assembled in them was done deliberately; in an emergency the Red Beard weapon could be handled in the same way in the United Kingdom.

A3 Assembly of this weapon was done in XA1.1. It was transported to "Marcoo" by motor truck without its cartridge. The cartridge was assembled and inserted in the bomb by the RA Assembly Group.

A4a This weapon was assembled in XA1.1 and was handed over to the RAF in precisely the condition of a weapon from their own Stores Department. Similarly the cartridge and fissile ball assembly were delivered to them by the RA Assembly Group. The purpose of this was to simulate normal Service procedure.

The practice rounds A4c2 and A4c3 were dealt with in the same way

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Classification Lead
8 Apr 2026

as A4a. The only difficulty encountered in these preparations was caused by unexpected cold weather. [redacted] Steps are being taken to install heating in the assembly buildings at Maralinga.

5. Tamper Trials

Experimental firings were simultaneously prepared for the following:-

A1TM2 This was assembled in AWRE [redacted] and flown to Maralinga by RAF Transport Command on 1st August.

A1TM3 This was assembled in AWRE [redacted] and flown out on 1st September.

A2TM2 This was assembled in AWRE [redacted] and flown out on 22nd July.

A2TM3 This was assembled in AWRE [redacted] and flown out on 7th August.

These four assemblies were delivered to the firing site as required by the TM Group.

A4(a)TM was assembled at Maralinga [redacted]. The high explosive, cut as required for Tamper Movement trials, was shipped from Aldermaston. The flask, which was shipped in S.S. PORT ADELAIDE, was to [redacted]. These firings were made to investigate wave shape and velocity.

Four more rounds were fired to determine the equation of state of uranium:-

ES2B1 and ES2B2 were assembled at Maralinga according [redacted] and with flask [redacted].

ES2C1 and ES2C2 were assembled at Maralinga [redacted] and with flask [redacted].

All the components of these rounds were shipped in S.S. PORT ADELAIDE,

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Classification Lead
8 Apr 2026

with the exception of the uranium cores and probe systems which were sent in separate containers by RAF Transport Command on 1st July, 1956. All of the flasks were opened for the TM Group to insert probes and wiring and were subsequently closed up and re-inspected.

6. Inspection

Adequate inspection was applied to the atom bombs and to the experimental firing assemblies. It was not found possible to include D.I.A's Inspectors in the Assembly Group although it was clearly desirable that the air-dropped atom bomb should be subjected to inspection equivalent to that normally applied to Service Weapons after ROF assembly. The Assembly Group included an officer from the Engineering Division to meet this requirement.

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