Written by David Boyd
Thursday, 01 January 2009 20:16 -

50lb, 120lb, 250lb, 500lb General Purpose Bombs

After the first world war the R.A.F. was left with a large stock of mixed bomb designs with different shapes, methods of construction and fuzing, after the main concern was reducing the R.A.F. to a peace-time footing and it was not until 1921 that bomb policy could be considered, it was also felt that the designs of new aircraft should be available before designing new bombs. It was decided under the circumstances to go ahead with limited investigations independent of bomb design This lead to four main areas of research.

1. The selection of an external contour of bomb to give the best shape for consistent ballistics, with a small trail angle.
2. The choice of a steel used in the body of bombs to give the best fragmentation.
3. Research into high explosive with greater power than TNT or Amatol.
4. The investigation of new methods of fuzing for the new bombs.

External Contour

Several different contours were considered and a large number of models were made for dropping trials from the air, three designs that gave the best results were selected and adapted for larger scale trials. The bomb that finally won easily was the one in which the maximum diameter and centre of gravity were both well forward of the "centre of pressure", the runner up shape was an "airship" type. This shape was adopted as the standard outline for all high explosive bodies, except the early armour-piercing bomb.

Type of Steel.

Three different thicknesses of wall and many different types of steel were tested but it was decided to wait until research into high explosives and fuzing had been completed before selecting a design.

High Explosive

Initially a mixture of TNT and CE (tetryl) showed great promise giving a yield 30% great than that of TNT or Amatol but had to be abandoned due to difficulties of acquiring enough supplies

of the explosive to meet demand, also it was found to be too sensitive for general filling conditions. Another Hexanite was tired which also gave a high yield than TNT alone but it had a tendency to leak through fuze holes/joints and so had to be abandoned. Several other types of explosive were also tested but these introduced other difficulties and so couldn't be used. So TNT/Amatol remained the standard filling for aircraft bombs.

Methods of Fuzing

Experiments into fuzing were carried out which took around twelve months, several different methods were tested and it was decided to concentrate on non-simultaneous initiation at each end.

In February 1924 after all the tests had been carried out, it was decided to go ahead with the designs of General Purpose Bombs. The idea of the General Purpose Bomb was that it should be easy to produce in large numbers and give a good percentage of efficiency against every type of target, obviously unlike a specialist bomb it would never give 100% effect against any target. It was decided to have both tail and nose fuzing to prevent break up of the bomb on a hard target and allow penetration of softer targets. Unfortunately this meant that the

bomb would have practically no anti-personnel effect on soft targets in the open - this lead to the development of smaller fragmentation bombs such as the 20lbF bomb.

It was realised that the design of the new fuzes would take years so it was decided to go ahead with a Mk I version of the bomb using existing fuze components It was hoped that the bombs would have a charge to weight ratio of 30% but this was not achieved and the ratio varied between 23% and 25%. Some difficulties were met with the experimental production of the bombs but eventually sufficient numbers of 250lb and 500lb bombs were made available for grouping trials.

Dropping trials were carried out in 1925, older bombs were also tested to compare, the results were very good with the G.P. bombs performing significantly better than the older bombs, getting groups of never more than 20 yards and in some cases 5-10 yards - compared with as much as 150 yards with the older bombs (dropped from 10,000 feet). After the trial it was decided to make several improvements to the bombs but it was also decided to put the bombs into production as soon as possible so the Mk I version entered production without the improvements and was filled with 80/20 Amatol - 1925/Early 1926.

Before the Mk II version of the bomb was introduced it was hoped to make as many improvements as possible and increase the charge to weight ratio to around 30% in the 500lb bomb, the companies who had made the experimental bombs were also contacted to see if they had any suggestions to improve manufacturing efficiency. From July 1926 the bombs were subjected to many different tests including, fragmentation trials, penetration ability against concrete and rough handling trials.

Many different types of explosives were tested including baratol due to worries of not being able to get a large enough supply of TNT and by September 1931 it was decided that the G.P. series would be filled with 80/20 amatol but it was also decided to make the designs suitable for TNT filling also. The Mk II version was designed for a filling of TNT.

In April 1935 investigations into making the bombs suitable for transport at all types of aerodromes, suitable for simplified types of bomb carriers and new types of release gears lead to the development of the Mk III bomb. In October 1935 all work on the 120lb bomb was abandoned. In April 1936 trails into the use of "snap-on" tails to allow assembly of large numbers of tail units in the field and the use of exploder containers at each end of the bomb to allow easier assembly of the fuze in the field, lead to the Mk IV series of bombs.

In July 1936 it was decided that the 120lb design would be required after all, by September 1936 the Mk IV versions of the 250lb and 500lb bombs were approved and the 120lb bomb was again abandoned.

A handful of 120lb G.P. had been made by the outbreak of war and some of these were used in Egypt in the early stages of the war, 250lb and 500lb G.P. bombs were the standard bombs of the R.A.F until they were replaced by the M.C. series in 1942. Large stocks of both these bombs existed so they were still being used till the end of the war, 50lb G.P. bombs do not seem to have been produced.

50lb and 120lb General Purpose bomb specifications

Bomb	50-lb G.P. Mk I
Construction	Cast steel or forged
Usual Weight	TNT 24.5lb (11.09kg) / Amatol - 47.8lb (21.72kg)
Charge/weight ratio	20.4% / 24.3%
Total length	37.7in (97.69cm)
Body length	31.5in (80.01cm)
Body diameter	5.98in (15.19cm)
Wall thickness	0.36in (0.92cm)
Tail length	15.39in (39.09cm)
Tail diameter	7.89in (20.04cm)
Filling	TNT / Amatol

Bomb	120-lb G.P. Mk I
Construction	Cast steel or forged
Usual Weight	TNT 54.5lb (24.72kg) / Amatol 80
Charge/weight ratio	24.3%
Total length	57in (144.78cm)
Body length	45in (114.30cm)
Body diameter	11.98in (30.43cm)
Wall thickness	0.98in (2.49cm)
Tail length	39.87in (101.27cm)
Tail diameter	11.98in (30.43cm)
Filling	TNT / Amatol 80/20

250lb General Purpose bomb specifications

[illegible]	[illegible] /VI
[illegible]	[illegible]
[illegible]	[illegible] kg)
[illegible]	[illegible] ratio
[illegible]	[illegible] cm)
[illegible]	[illegible] cm)
[illegible]	[illegible] cm)
[illegible]	[illegible] cm)
Tail len[illegible]	[illegible] cm)
[illegible]	[illegible] cm)
[illegible]	[illegible] 40

500lb General Purpose bomb specifications

[illegible]	[illegible] /VI
[illegible]	[illegible]
[illegible]	[illegible] kg)
[illegible]	[illegible] ratio
[illegible]	[illegible] cm)
[illegible]	[illegible] cm)
[illegible]	[illegible] cm)
[illegible]	[illegible] cm)
Tail len[illegible]	[illegible] cm)
[illegible]	[illegible] cm)
[illegible]	[illegible] 40

Number of General Purpose bombs dropped per year

Bomb

1940

1941

1942

1943

1944

1945

120lb GP

793

1,062

61

3

-

-

250lb GP

80,689

73,696

105,233

-

500lb GP/MC

20,422

74,998

56,524

122,609

1,103,450

351,608

Sources - AVIA 46 285, AVIA 46 163