

## Chapter 1

### POWER CARTRIDGES

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#### Introduction

1. The various power cartridges used in conjunction with ejection seats, canopy jettison systems and training rigs are described in A.P. 1661F, Vol. 1. The cartridges for aircraft ejection seats are issued as sets which include the drogue gun cartridges. Canopy jettison and training rig cartridges, although more appropriate to other sections in this book, are included in this chapter for convenience.

#### Mk. 2 cartridges

2. A Mk. 2 range of cartridges has been developed for Martin Baker ejection guns complementary to E.S. Modification No. 347 or 348 which alter the configuration of the ejection gun breech. This has been found necessary because when the Mk. 1 cartridge is used the rate of rise of acceleration is above the acceptable limit.

3. This re-design and development has given an opportunity to introduce a propellant which gives more constant performance in all expected operating conditions. The cartridges are identified by a colour coding and appropriate colour marking on the cartridge case.

4. Table 1 gives the composition of each set of seat-ejection cartridges, and shows that the drogue gun cartridge is the same in both the Mk. 1 Series and the Mk. 2 Series. Table 2 shows the applicability of the old and new type cartridges.

#### Guns, Type 1, 1A, 2, 2A and 2B

5. Cartridge changes are covered by Modification No. Arm. 687 under classification D.4.

6. The new cartridges have the advantage of increasing the velocity in cold climatic conditions with no appreciable increase in acceleration or rate of rise of acceleration at normal and high temperatures.

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7. As the No. 3, Mk. 2 cartridge only is associated with E.S. modification No. 347 or 348, Cartridge sets, No. 1, Mk. 1 and No. 2, Mk. 1 may continue to be used in their appropriate ejection guns, the change to sets No. 1, Mk. 2 and No. 2, Mk. 2 being effected in accordance with modification classification.

#### Guns, Type 3, 3A, 3B, and 3C

8. Cartridge changes are covered by Modification No. Arm. 688, Classification B.2. Complementary with this modification is Mod. E.S.347 or Mod. E.S.348.

9. Modification E.S. No. 347 introduces a distance piece in the breech in place of the cartridge reject spring.

10. Modification E.S. No. 348 introduces in new production a shortened primary cartridge breech housing without a cartridge spring or distance piece.

11. Ideally the No. 3, Mk. 2 cartridge should replace the No. 3, Mk. 1 cartridge at the same time as Mod. No. E.S.347 or Mod. No. E.S.348 is embodied. If, however, it is necessary to use the No. 3, Mk. 1 cartridge in guns in which either Modifications No. E.S.347 or No. E.S.348 is embodied, the resulting rate of rise of acceleration would be above that which is normally acceptable; this condition may be accepted for this interim period during the changeover to the Mk. 2 cartridges.

12. No. 3, Mk. 2 cartridges may be used in unmodified breeches as this combination will not appreciably increase the gun performance. The introduction of Mod. No. E.S.347, however, is not to be delayed beyond its correct classification.

#### Guns, Type 4, 4A, 4B, 4C, 4D and 4E

13. Cartridge changes are covered by Modification No. Arm. 688, Classification B.2.

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14. The performance of the above guns was inconsistent when assembled with grease. A consistent performance was achieved by the subsequent change from grease to oil, but the rate of rise of acceleration increased above that which is normally accepted and, to reduce the rate of rise

of acceleration, the No. 4 cartridge has been introduced.

15. All production guns have been delivered with the piston tubes lightly oiled, so that degreasing action in service is not required.

**Table 1**  
**Composition of Mk. 1 and 2 seat-ejection cartridge sets**

Mk. 1 Series cartridges	Mk. 2 Series cartridges
Set No. 1, Mk. 1 (12K/1224), comprising:— One No. 1, Mk. 1, primary (12K/1170) One No. 1, Mk. 1, secondary (12K/1183) One No. 1, Mk. 1, drogue (12K/1171)	Set No. 1, Mk. 2 (12K/1298), comprising:— One No. 1, Mk. 2, primary (12K/1293) One No. 1, Mk. 2, secondary (12K/1296) One No. 1, Mk. 1, drogue (12K/1171)
* Set No. 2, Mk. 1 (12K/1225), comprising:— <u>One No. 1, Mk. 1, primary (12K/1170)</u> <u>One No. 1, Mk. 1, drogue (12K/1171)</u>	Set No. 2, Mk. 2 (12K/1299), comprising:— One No. 1, Mk. 2, primary (12K/1293) One No. 1, Mk. 1, drogue (12K/1171)
Set No. 3, Mk. 1 (12K/1256), comprising:— One No. 2, Mk. 1, primary (12K/1254) Four No. 2, Mk. 1, secondary (12K/1255) One No. 1, Mk. 1, drogue (12K/1171)	Set No. 3, Mk. 2 (12K/1300), comprising:— One No. 3, Mk. 2, primary (12K/1294) Four No. 3, Mk. 2, secondary (12K/1297) One No. 1, Mk. 1, drogue (12K/1171)
Set No. 4, Mk. 1 (12K/1279), comprising:— One No. 3, Mk. 1, primary (12K/1280) Two No. 3, Mk. 1, secondary (12K/1281) One No. 1, Mk. 1, drogue (12K/1171)	Set No. 4, Mk. 2 (12K/1301), comprising:— One No. 4, Mk. 2, primary (12K/1295) Two No. 4, Mk. 2, secondary (12K/1302) One No. 1, Mk. 1, drogue (12K/1171)

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TABLE 2  
Applicability of Mk. 1 and 2 cartridges

Gun Type No.	Ref. No. 27L/-	Ejection gun Part No.	Seat applicability	Mk. 1 cartridges				Mk. 2 cartridges				Colour code
				Ref. No. of Set 12K/-	Set No.	Primary	Secondary	Ref. No. of Set 12K/-	Set No.	Primary	Secondary	
1	2	E/MBEU/1340	1A, 1B, 1C, 1D, 2A, 2B, 2D, 2E, 2H, 2G	1224	No. 1, Mk. 1	No. 1, Mk. 1 (B/MBEU/19)	No. 1, Mk. 1 (B/MBEU/1317)	1298	No. 1, Mk. 2	No. 1, Mk. 2 (B/MBEU/320AVR)	No. 1, Mk. 2 (B/MBEU/321AVR)	Green
1A	250	E/MBEU/467VS										
2	352	E/MBEU/5V	1F, 2C, 3B	1225	No. 2, Mk. 1	No. 1, Mk. 1 (B/MBEU/19)	Not fitted	1299	No. 2, Mk. 2	No. 1, Mk. 2 (B/MBEU/320AVR)	Not fitted	Green
2A	657	E/MBEU/145V	4A1									
2B	658	E/MBEU/15SV	4A2									
3	369	E/MBEU/3700	1C(N), 2B, 2D, 2H, 2J, 3A1, 3A2, 3CT, 3H, 3J, 3JT, 3K1, 3K2, 3L1, 3L2	1256	No. 3, Mk. 1	No. 2, Mk. 1 (B/MBEU/3792)	No. 2, Mk. 1 (O/MBEU/3909)	1300	No. 3, Mk. 2	No. 3, Mk. 2 (B/MBEU/801AVR)	No. 3, Mk. 2 (O/MBEU/802AVR)	White
3A	588	E/MBEU/610VS	2G, 3G									
3B	1037	E/MBEU/630VS	2G, 3G									
3C	1308	E/MBEU/11189	3C, 3CS, 3JS, 3KS1, 3KS2, 3LS1, 3LS2									
4	593	E/MBEU/5001	4C, 4Q	1279	No. 4, Mk. 1	No. 3, Mk. 1 (B/MBEU/5046)	No. 3, Mk. 1 (O/MBEU/5351)	1301	No. 4, Mk. 2	No. 4, Mk. 2 (B/MBEU/7840)	No. 4, Mk. 2 (O/MBEU/5351/1)	Brown
4A	1011	E/MBEU/5485	4H1, 4H2									
4B	1307	E/MBEU/601SV	4A1									
4C	1306	E/MBEU/600SV	4A2									
4D	1113	E/MBEU/744DH	4D1									
4E	1114	E/MBEU/735DH	4D2									
	1154	E/MBEU/7147DH	4B									
	1365	E/MBEU/8140	4M1, 4M2, 4P1, 4P2									

**TABLE 3**  
**MISCELLANEOUS POWER CARTRIDGES**

Ref. No. 12K/	Description	No.
599	Cartridges, cockpit canopy jettison, primary, No. 2, Mk. 1	1
1260	Cartridges, cockpit canopy jettison, No. 1, Mk. 1	1
1261	Cartridges, cockpit canopy jettison, No. 2, Mk. 1	1
1219	Cartridges, seat ejection training, No. 1, Mk. 1, primary, Grade B	1
1277	Cartridges, cockpit canopy jettison, No. 3, Mk. 1	1
1291	Cartridges, cockpit canopy jettison, No. 4, Mk. 1	1

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