

## GROUP G — ARMAMENT

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## Introduction

1. The information in this group covers the whole of the armament systems which may

be collectively, or singly, used on the aircraft. The components are described in the specialist Air Publications listed below.

Equipment	Air Publication
Micro switch, Type 1A	4343C, Vol. 1, Sect. 1, Chap. 4
Relay, Type P1	4343C, Vol. 1, Sect. 3, Chap. 3
Relay, Type S1 and S3	4343C, Vol. 1, Sect. 3, Chap. 8
<b>Suppressor, Type F2 and P2</b>	<b>4343C, Vol. 1, Book 3, Sect. 5</b>
Voltage regulator, 1 type 22	4343B, Vol. 1, Sect. 1, Chap. 1
Control column handle, Type AC.1400	4343X, Vol. 1, Sect. 7, Chap. 1
Retraction unit, Type 3, Mk. 3	1275E, Vol. 1, Sect. 6, Chap. 4
Maxiflux gun firing unit	1641E, Vol. 1
Two-way bomb distributor	4343X, Vol. 1, Sect. 3, Chap. 1
E.M. release unit, Mk. 1	4343X, Vol. 1, Sect. 5 at a later date
Carrier unit, EM/EF, 100/1,000 lb.	4343X, Vol. 1, Sect. 5, Chap. 6
Light-series bomb carrier	4343X, Vol. 1, Sect. 1 at a later date
Four-way auto-selector, Type B	1095B, Vol. 1, Sect. 2, Chap. 7
Resistance and relay unit	4343X, Vol. 1, Sect. 16 at a later date
Camera, G.45B, Mk. 3	1355D, Vol. 1, Sect. 1, Chap. 3

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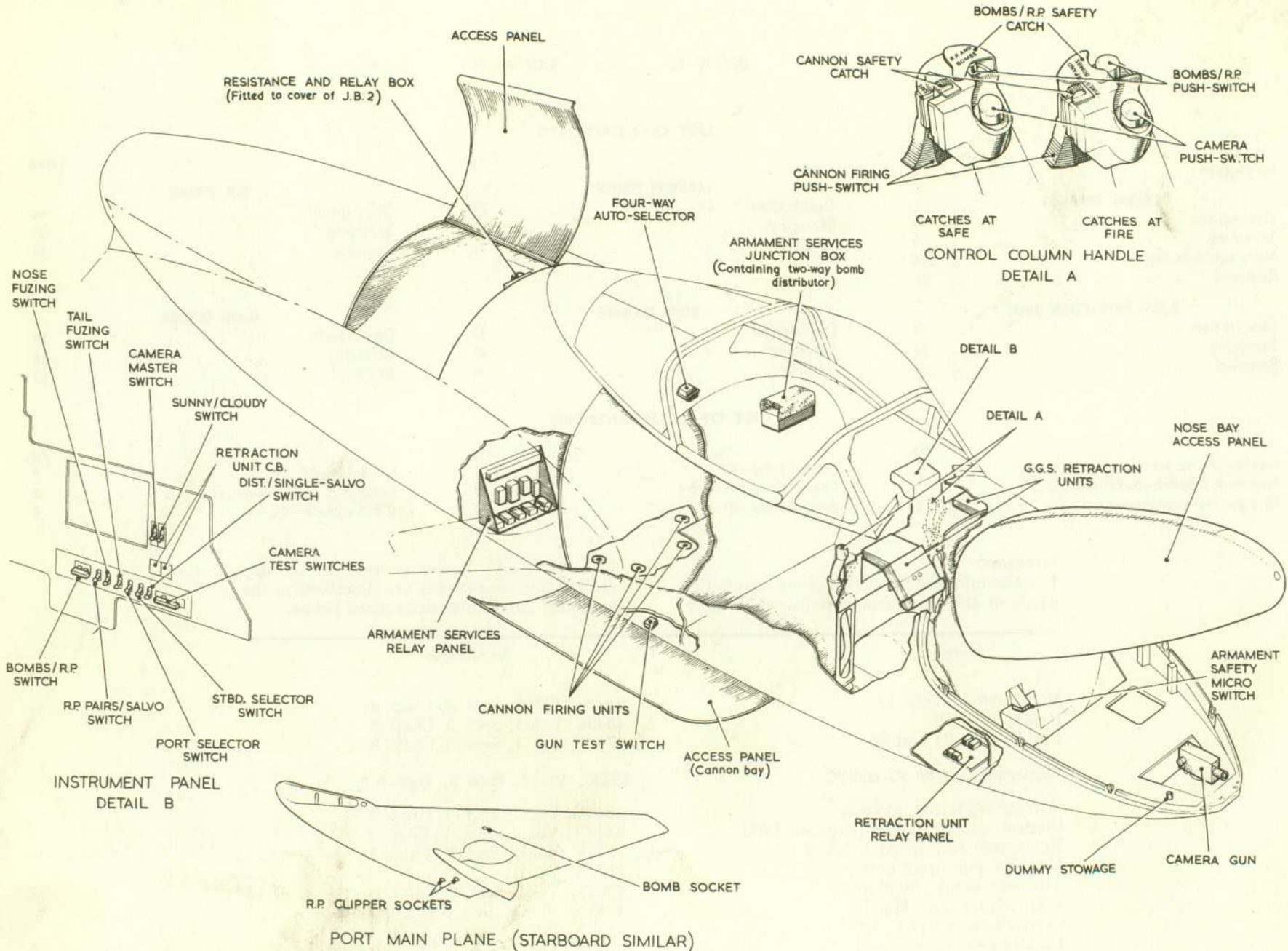


Fig.1. Location and access of components

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**GENERAL SUPPLIES****Description**

2. To avoid duplication of certain components in the armament system illustrations, the components forming the core of the system are shown on fig. 2 of this group. In certain instances, duplication is still necessary on some illustrations; the duplicated wiring, in these cases, is shown dotted.

3. Each armament service, except that for the G.G.S. retraction units, derives its electrical supply via components in the armament services relay panel fitted to the lower forward face of bulkhead 4.

4. Three terminal blocks form a cable break between the services and the components inside the relay box; the terminal block connections to the services are annotated, on fig. 2, with the relevant service reference.

5. Similarly, each armament service, except again for the G.G.S. retraction units, is controlled by push-buttons fitted integrally with the straight-type control column handles. The two handles are wired in parallel with each other.

6. All the fuses for the armament services are housed in the armament services junction box, which is mounted on the forward face of bulkhead 2, behind the pupil pilot's seat. A wander lamp socket is fitted on this box to allow a 24-volt inspection lamp to be supplied from the aircraft batteries and used for servicing.

7. An armament safety micro switch, ganged mechanically with the alighting-gear nose up-lock and door-lock micro switches, completes the d.c. supply to the control column handle firing push-switches when the alighting gear is locked up.

8. The armament safety switch may be shorted out for testing the G 45 camera, while the aircraft is on the ground, by operating the ganged camera test switches to the TEST position. These switches are fitted to the instrument panel and connect the supply only to the G 45B camera. The can-

non, bomb and R.P. circuits are open-circuited by the operation of these switches. The bombs/R.P. switch, however, must not be set to R.P. or the camera caging relay will remain energised after the camera push-switch on the control column handle is released (para 64 and 65). To enable the guns to be cleared without personnel moving to the front of the aircraft to depress the nose-wheel operated micro-switch, a gun test switch is fitted to the starboard side of the cannon bay just aft of No. 2 bulkhead.

**Servicing**

9. All the components shown on fig. 2 are described in the specialist Air Publications listed in para. 1.

**Micro switch setting**

10. The armament safety micro switch is set simultaneously with the alighting gear nose up lock and door lock micro switches (refer to Group F).

**Removal**

11. The armament safety micro switch is easily removed via the access panel in the nose bay.

12. All components in the armament services relay panel are easily removed once the panel itself has been removed from the forward face of bulkhead 4. To remove the panel, remove the nine 2 B.A. nuts and bolts and suspend the panel from the bulkhead with cord such that the weight of the panel is taken by the cord and not by the panel wiring.

13. To remove any component in the armament services junction box, the box must be removed from the forward face of bulkhead 1 by removing the four retaining 4 B.A. screws and washers. To gain access to the box, the pupil pilot's ejection seat must first be removed.

14. The removal of any switch housed in the straight type control column handle, is described in A.P.4343X, Vol. 1, Sect. 7, Chap. 1.

**G.G.S. RETRACTION UNITS****Description**

15. Each gyro gun sight, described in Chapter 2, Appendix 1 of this Section, is mounted on a retraction unit, these units being fitted in front of the instrument panel to allow both gyro gun sights to be retracted when not required, so giving both pilots an uninterrupted forward view and affording a clear path for ejection of the seats.

16. Each retraction unit is supplied via a 10-amp. circuit breaker fitted to the instrument panel (fig. 3). If either selector switch, fitted adjacent to each retraction unit, is set to UP, the unit's motor is energised, thus extending the mounting carriage and moving the gun sight to its combat position.

17. At the same time a supply is directed, via the retraction units, through fuses 20 and 21 inside J.B.1. to energise either or both relays fitted to the retraction unit relay panel. These relays supply fuses 1 and 2, via fuse 3, in the armament services junction box.

18. These fuses are repeated on fig. 2 for clarity. They are the fuses for both gyro gun sights, fuse 2 carrying 28 volts d.c. supplied from the aircraft generator system, while the fuse 1 supply is regulated to  $22 \pm 0.5$  volts d.c. by the voltage regulator, Type 22. Therefore the selector switches for the retraction units serve also as selector switches for the gun sights.

19. The retraction unit motors are each controlled by an integral limit switch. When the retraction unit is down, contacts C-D of the limit switch are made, creating a closed circuit for the motor, thus effecting regenerative braking.

20. Provision for emergency retraction is afforded by a black and white painted knob on the right of each retraction unit. This rod, when pushed forward, operates a push-rod coupled to the mechanical release mechanism.

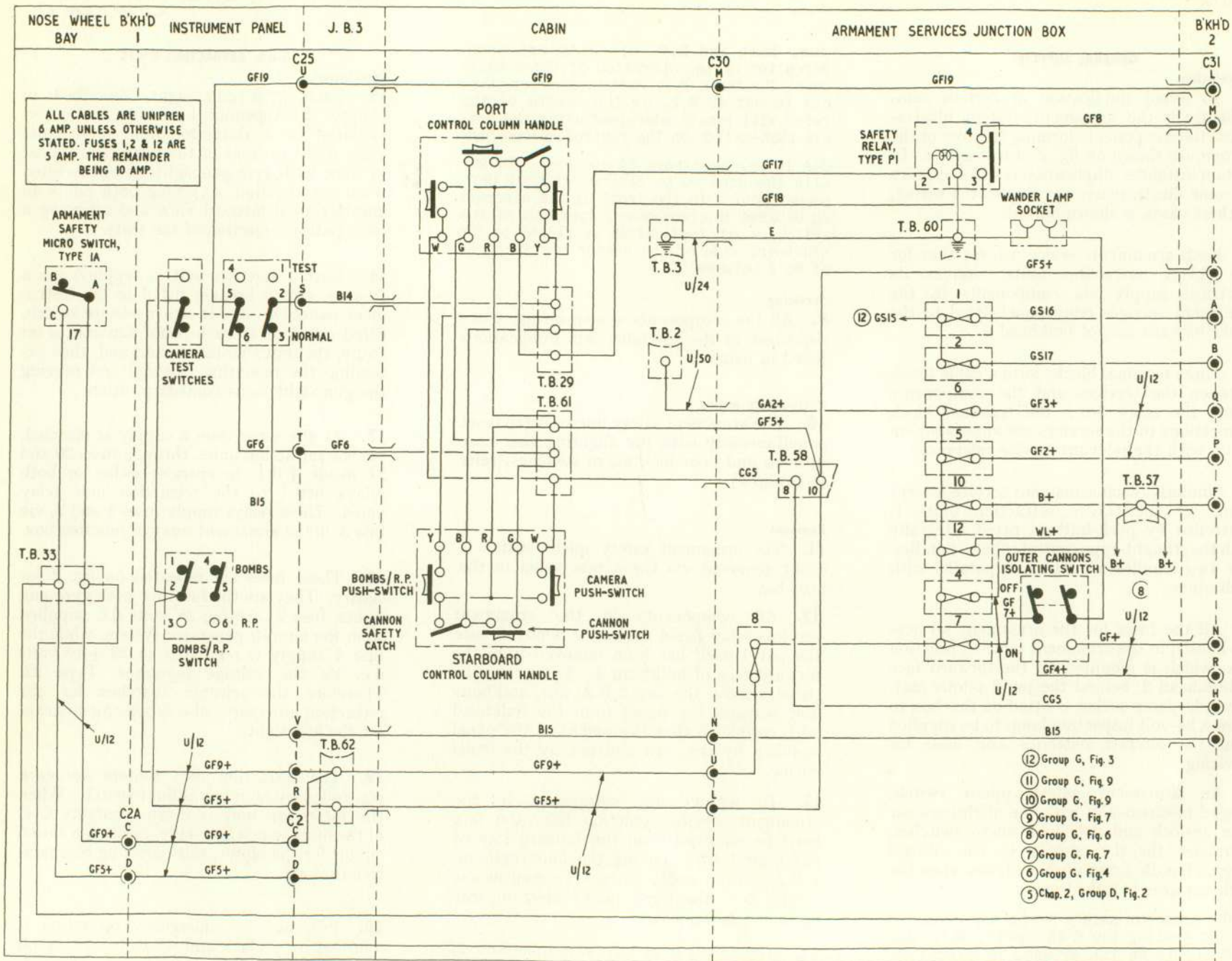
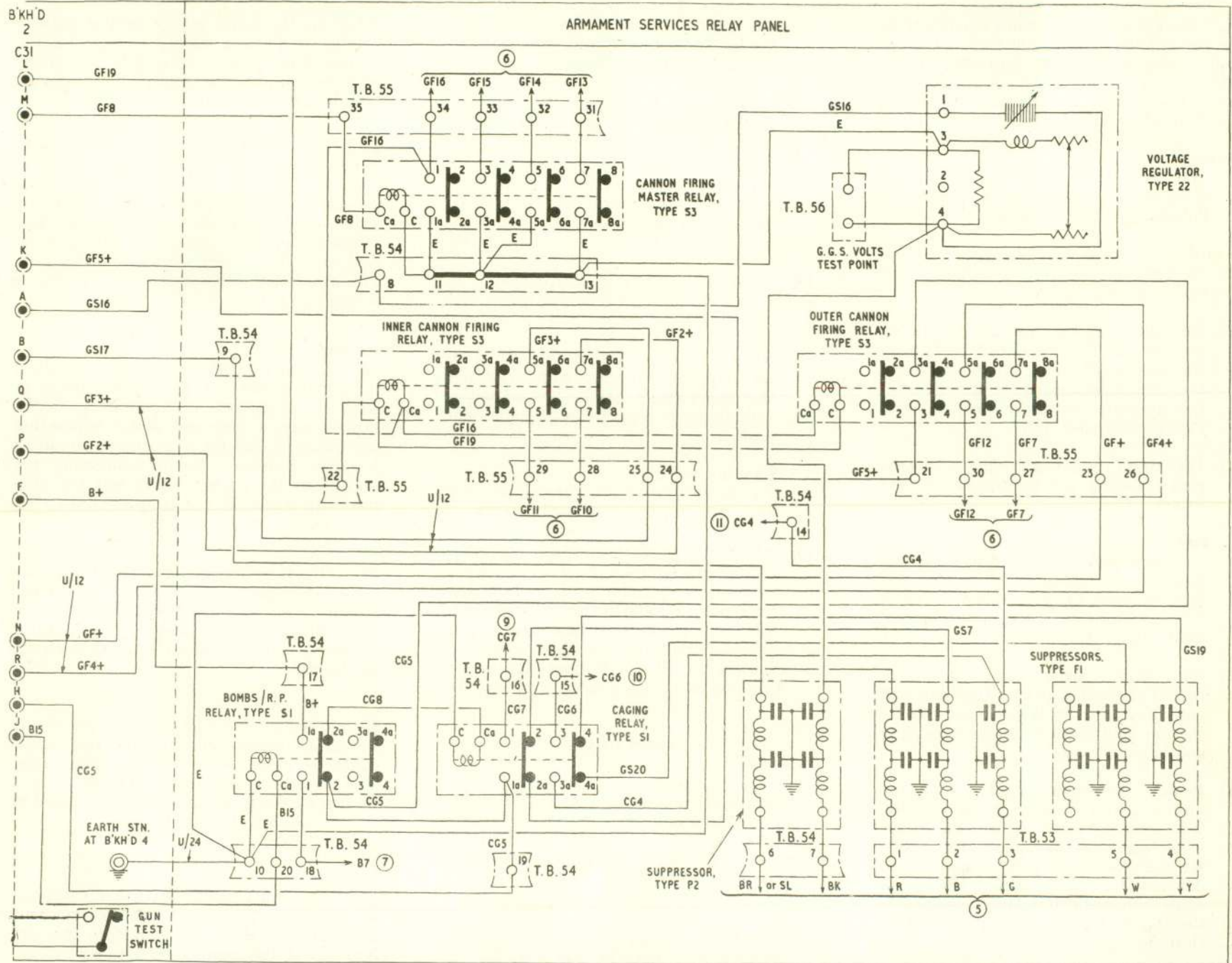


Fig. 2. Armament



supplies - B, R.P., GS, CG, GF

21. The knob must be struck smartly with the palm of the hand to break the 18 s.w.g. copper wire locking the push-rod to the retraction unit's side frame. A gravity lock mechanism secures the movable carriage in the down position.

#### Servicing

22. The retraction unit and relays employed in the circuit are described in the specialist Air Publications listed in para. 1.

#### Removal

23. To remove either retraction unit, adopt the following procedure:—

(1) Run the retraction unit to its combat position and trip the circuit breaker on the instrument panel, thus maintaining the combat position of the unit. Render the aircraft electrically safe (*General Information, para. 18*).

(2) Disconnect the gyro gun sight and, on the port mounting only, the recorder camera socket.

#### Note . . .

*The range control and the gyro and optics plugs are interchangeable; the former is therefore marked in RED and the latter in GREEN, and their mating sockets marked accordingly.*

(3) Give the gun sight locking pin on the rear of the unit a quarter turn and pull out. Now unscrew the star nut holding the gun sight to the mounting base plate and remove the sight.

(4) Remove the selector switch from the unit to afford clearance when lowering the instrument panel. Release the instrument panel by unlocking the Oddie fasteners, lower the panel rearward and downward and disconnect the strain wires from their attaching key-rings at the top of the panel to allow further clearance.

(5) Disconnect the gyro gun sight and camera recorder sockets and the ten-way terminal block from the unit.

(6) At the base of the windscreen, remove the locking wire and nuts from the two bolts and withdraw the bolts.

(7) Unscrew the Simmonds nut from the forward fixing bolt and withdraw the bolt.

(8) Withdraw the retraction unit from its location, taking care not to foul or damage any other items of equipment.

24. Refitting is the reverse of removal. It is advisable to check the following before and after refitting:—

(1) BEFORE: Ensure that the retraction unit motor is at the combat position and that the jettison handle is wire-locked with 18 s.w.g. copper wire in its normal position.

#### Warning . . .

*The motor must not be operated while the unit is in its jettison retracted position.*

(2) AFTER: Check the jettison operation of the unit without the gyro gun sight fitted. Re-set the unit, re-lock the jettison handle and fit the gyro gun sight. Carry out an electrical functional test of the retraction unit, gyro gun sight and camera recorder. The gun sight must now be harmonized (Sect. 7, Chap. 3).

### CANNON FIRING

#### Description

25. The provision for, and installation of, the cannons is described in Sect. 7, Chap. 3. They are electrically fired, being fitted with electrical Maxiflux sear mechanisms. The firing circuit is controlled by an armaments safety micro switch (*para. 7*).

26. To fire the cannons, the safety catches on both control column handles must be set to FIRE (*fig. 2*). The catch on the instructor pilot's control column handle completes the circuit to energise the safety relay, while the

catch on the pupil pilot's control column handle conducts a supply to energise the cannon firing master relay, via the safety relay, to complete the negative return for all four Maxiflux gun-firing units.

27. Pressure on either cannon firing push-switch will now complete the circuit to energise the inner and outer firing relays, provided the outboard cannons isolating switch, fitted to the armament services junction box, has been selected, and all cannons will fire, deriving their supply from the firing relays. The firing units supply is shown on fig. 5.

#### Servicing

28. The Maxiflux firing units are described in the specialist Air Publication listed in para. 1. At the rear cannon stirrups in the cannon bay, a plug and socket connection has been installed for each cannon circuit as a safety measure. Before connecting the sockets to the plugs, always test the plug pins with a suitable test lamp to ensure that the firing circuit is not closed.

29. All safety devices, namely, the armament safety micro switch, the safety catches on the control column handles and the rear stirrup breaks, should be frequently inspected and maintained in good electrical condition.

30. Periodic functional checks of the circuit should be made using suitable test lamps connected in lieu of the Maxiflux firing units. The method of making up the socket connectors for the firing unit cables is detailed in A.P.4343X, Vol. 1, Sect. 13, Chap. 1.

#### Removal

31. Each firing unit is fitted to a base plate by a large serrated wheel-type securing bolt, the plate in turn being secured to the sear housing of the cannon by six set screws. Removal of the firing units should be undertaken only by qualified Armaments tradesmen.

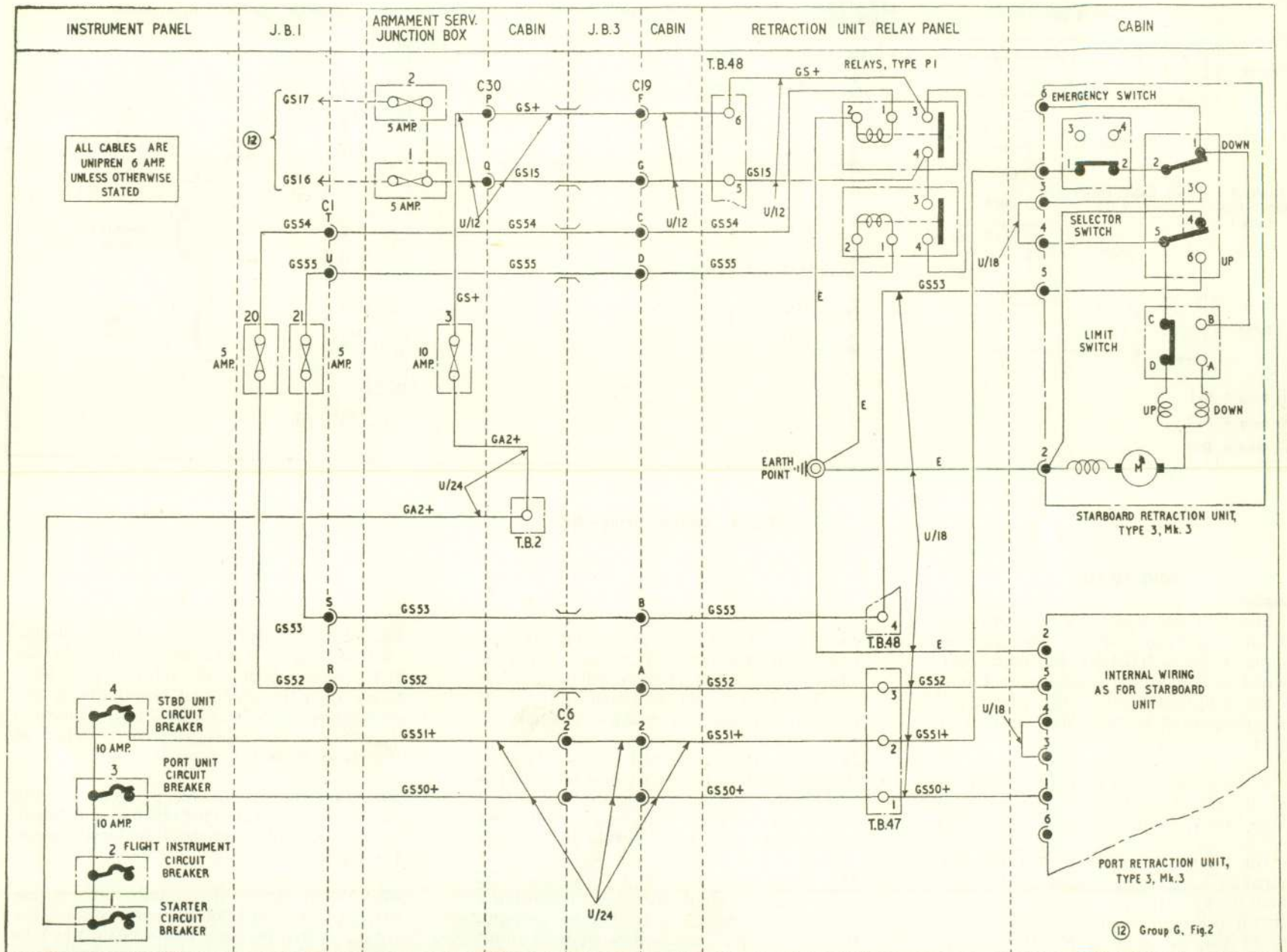


Fig. 3. Gyro gun sight retraction units—GS

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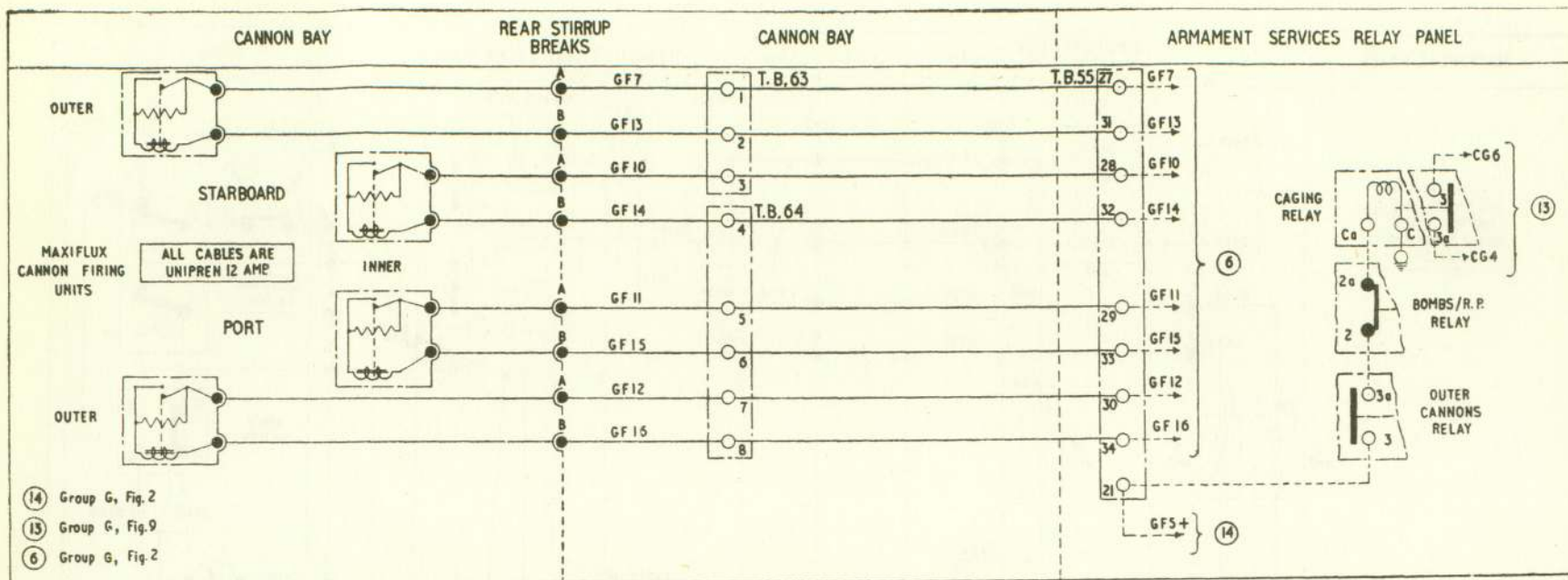


Fig. 4. Cannon firing—GF

### BOMB RELEASE

#### Description

32. Sect. 7, Chap. 4 describes the provision made for carrying bombs. The standard provision is for a 100/1,000 lb. bomb beam attached to a mechanical release unit built into the wing outboard of the wheel well. This arrangement is illustrated in Sect. 7, Chap. 4.

33. A light-series bomb carrier may be fitted to the 100/1,000 lb. bomb beam, allowing small practice bombs to be carried.

34. The built-in mechanical release unit is actuated by selection of a handle in the cabin, situated between the pilots' seats. When the 100/1,000 lb. bomb beam is coupled mechanically to the mechanical release unit, the bomb beam is electrically connected to a seven-pin clipper socket fitted to the lower wing skinning.

35. When the bombs are to be dropped, pressure on the bombs/R.P. push-switch on either control column handle will energise the bombs/R.P. relay via the camera test switch, this switch being in its NORMAL position.

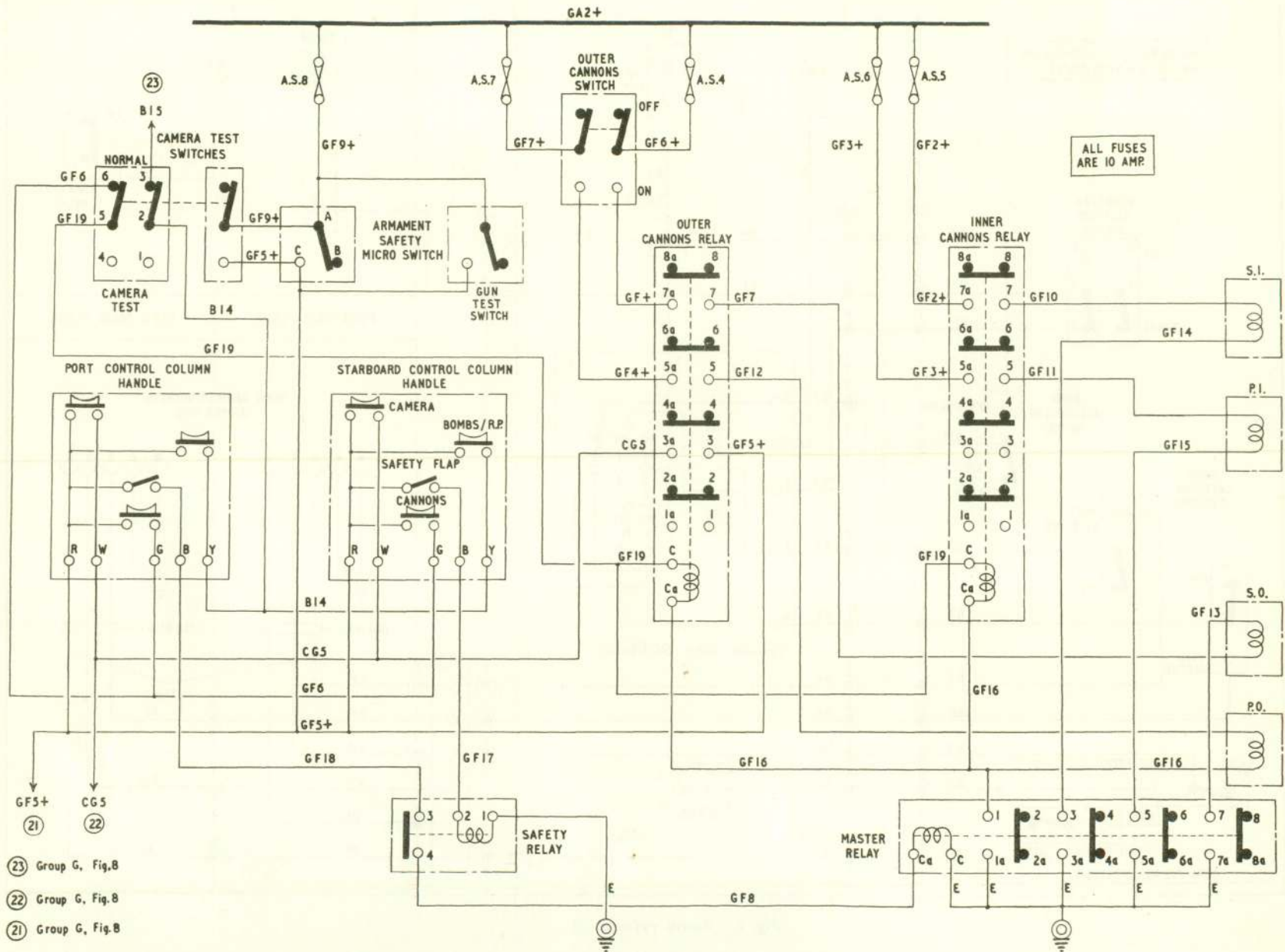
36. With the bombs/R.P. relay closed, a supply from fuse 10 in the armament services junction box is conducted to the bombs/R.P. selector switch, fitted to the instrument panel, via contacts 1-1a of the bombs/R.P. relay.

37. With this switch set to BOMBS, coil R1 of the two-way bomb distributor is energised, closing contacts M1, and thereby dropping the port or starboard bombs, or both simultaneously, as selected by the individual bomb selector switches fitted to the instrument panel.

38. With the distributor and both selector switches closed, operation of either bomb/R.P. push-switch will release the port, followed by the starboard, bomb after a predetermined time delay of 0.3 sec. This time delay is due to the slugging of the relays in the two-way bomb distributor.

39. Two conventional fuzing units, nose and tail, are fitted in the 100/1,000 lb. bomb beam, and are controlled by individual switches on the instrument panel.

40. When light-series bomb carriers are fitted to the 100/1,000 lb. bomb beams, the rotary switch on each bomb beam must be set to its s.B.C./s.C.I. position and the two-pin plug of the carriers mated with the two-pin socket of the bomb beams.



- 23 Group G, Fig. B
- 22 Group G, Fig. B
- 21 Group G, Fig. B

Fig. 5. Cannon firing theoretical

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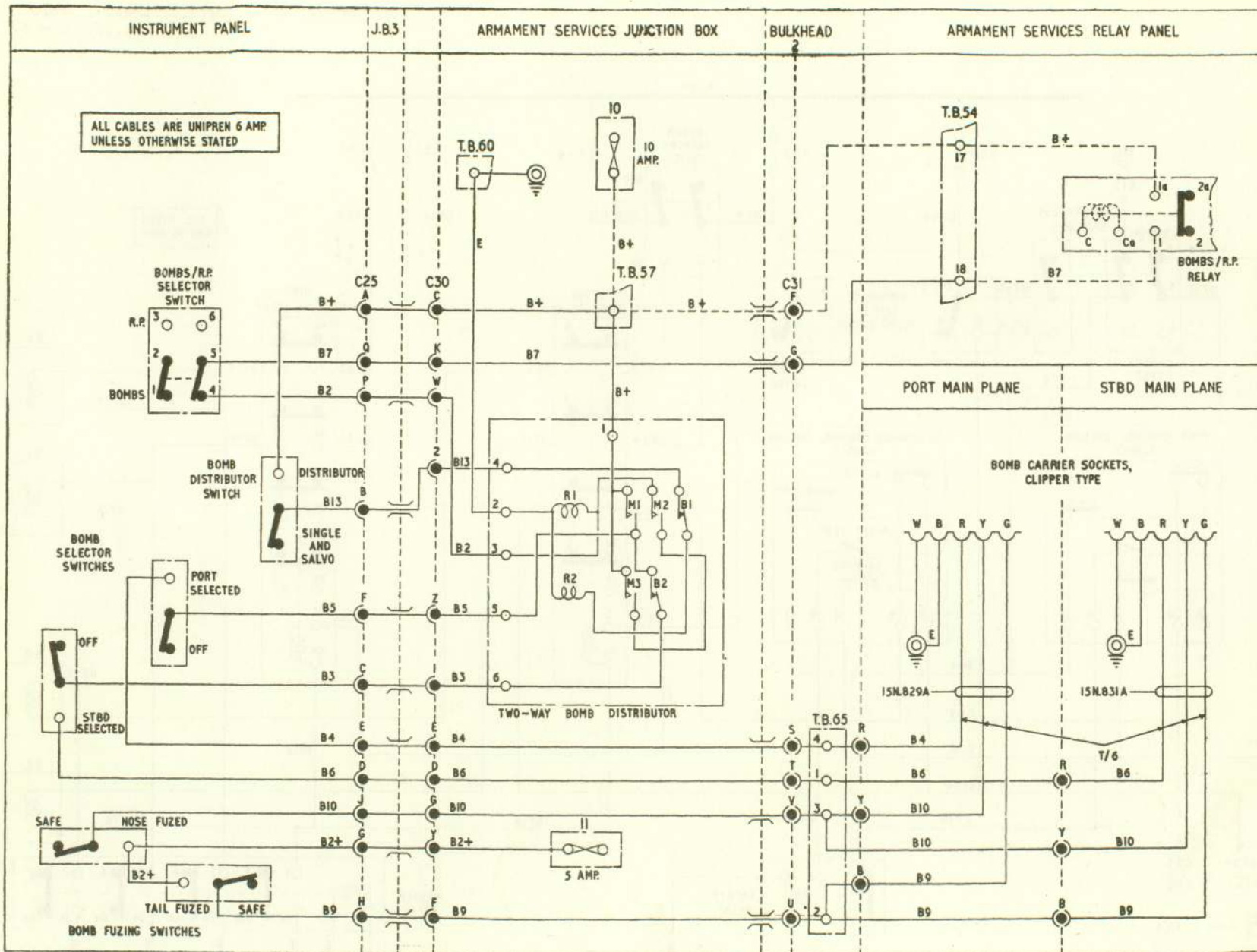


Fig. 6. Bomb release—B

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41. The light-series carrier cannot be electrically jettisoned. The bomb beam may be jettisoned mechanically by operating the handle in the cabin so actuating the mechanical release unit. This handle is annotated DROP TANKS JETTISON LEVER.

#### Servicing

42. The components in the bomb circuit and installation are described in the specialist Air Publications listed in para. 1.

43. The cable insulation resistance to earth should be periodically tested as a separate circuit, the reading obtained to be not less than 500,000 ohms. The cables and wing clipper sockets must be maintained in good condition and kept free from moisture.

44. A functional test of the mechanical release unit can be carried out by suspending from the release jaws weighted eyes of the type specified for testing the fuel drop tank release mechanism (Sect. 4, Chap. 2).

#### Removal

45. The removal of the two-way bomb distributor, fitted in the armament services junction box, is described in para. 13 of this Group, while the mechanical release unit must be removed in conjunction with the engine tradesman.

#### R.P. FIRING

##### Description

46. Sect. 7, Chap. 2 describes the provision and the method of attachment to the aircraft of rocket projectiles. Eight projectiles may be carried, four beneath each mainplane in banks of two.

47. The projectiles are electrically fired, being connected to the saddle attachments on the main plane by pig-tail electrical connections; the saddles in turn being electrically connected to the main plane by three-pin plugs.

48. The firing circuit consists of the bombs/R.P. push-switch on the control column

handle and the bombs/R.P. relay fitted in the armament services relay panel.

49. The selection control circuit includes the bombs/R.P. and pairs/salvo selector switches fitted to the instrument panel, a four-way auto-selector switch fitted to the cabin canopy decking, a relay and resistance unit fitted to the cover of junction box 2, the safety breaks in the wheel wells and the three-pin sockets at the R.P. saddle connections in the main planes.

50. Pressure on the bombs/R.P. push-switch on the control column completes the circuit to energise the bombs/R.P. relay via the camera test switch, this switch being in its NORMAL position. This relay, when energised, connects a supply to the bombs/R.P. selector switch from fuse 10 via its contacts 1-1a.

51. With the switch closed to R.P., the supply is then conducted to the auto-selector switch, and thence, in sequence, to the resistance and relay unit, through the safety breaks to the main plane sockets and thence to the projectiles.

52. With the auto-selector set to No. 1, the first depression of the bombs/R.P. push-switch will fire the outer-lower rocket on each main plane. Successive operations of this push-switch will then fire the outer-upper, inner-lower and inner-upper R.P.'s, respectively.

53. If the pairs/salvo switch has been closed, the relay in the relay and resistance unit will be energised and, with the auto-selector again set to No. 1, the first depression of the bombs/R.P. push-switch will fire all the lower R.P.'s; the next depression of this push-switch will then fire all the upper R.P.'s. The circuit is inter-connected with the G.45B camera circuit (*para. 64*).

#### Servicing

54. The specialist Air Publications listed in para. 1 describe the equipment used in the R.P. firing system.

55. Periodically, an insulation resistance test to earth of the circuit wiring should be carried out. The reading obtained should not be less than 200,000 ohms.

56. A functional test may be carried out by fitting a suitably mounted test lamp to each pig-tail connector of the rear saddles. Check that these lamps light in the correct sequence, as detailed in the previous paragraphs.

#### Note . . .

*The upper connection on each saddle is the lower r.p. connector.*

57. Prior to connecting the projectiles to the saddle pig-tail connectors, the following safety procedure is recommended:—

- (1) Fit suitably mounted test lamps, Stores Ref. 5G/310, to each rear saddle pig-tail connector. Check that no lamps glow.
- (2) Open the safety break in each wheel well.
- (3) Prior to take-off, reconnect the safety breaks and check that the test lamps do not glow.
- (4) When check (3) is satisfactory, remove the lamps and connect the projectiles to the rear saddles.

#### Removal

58. The four-way auto-selector switch is easily removed, as is the resistance and relay unit. The latter, however, can only be removed after the lid of J.B.2 has been removed by loosening its four Dzus fasteners

#### G.45B CAMERA

##### Description

59. A cine camera is mounted in the nose compartment to record gun or rocket projectile firing, or for use as an individual practice attack weapon.

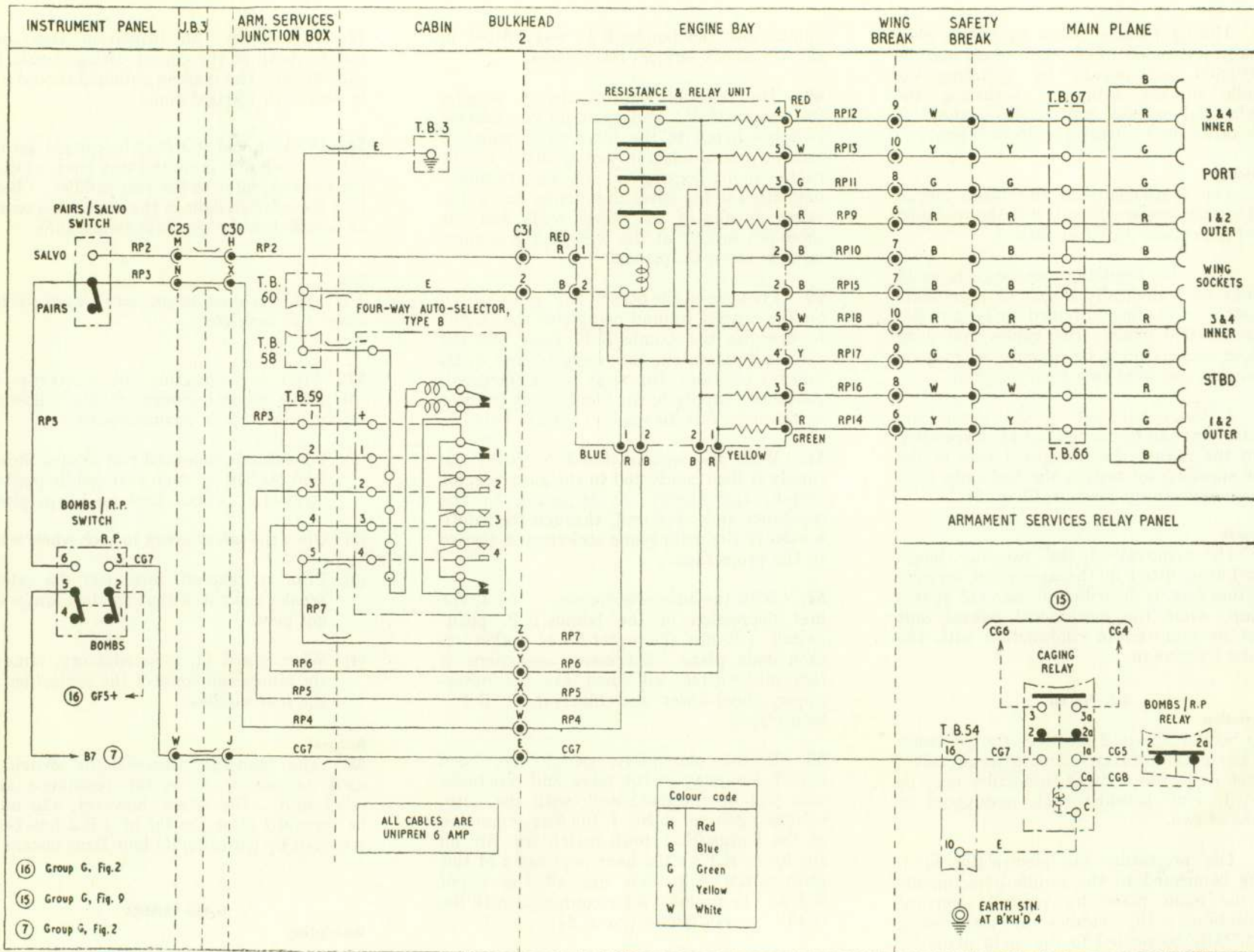


Fig. 7. R.P. firing—RP

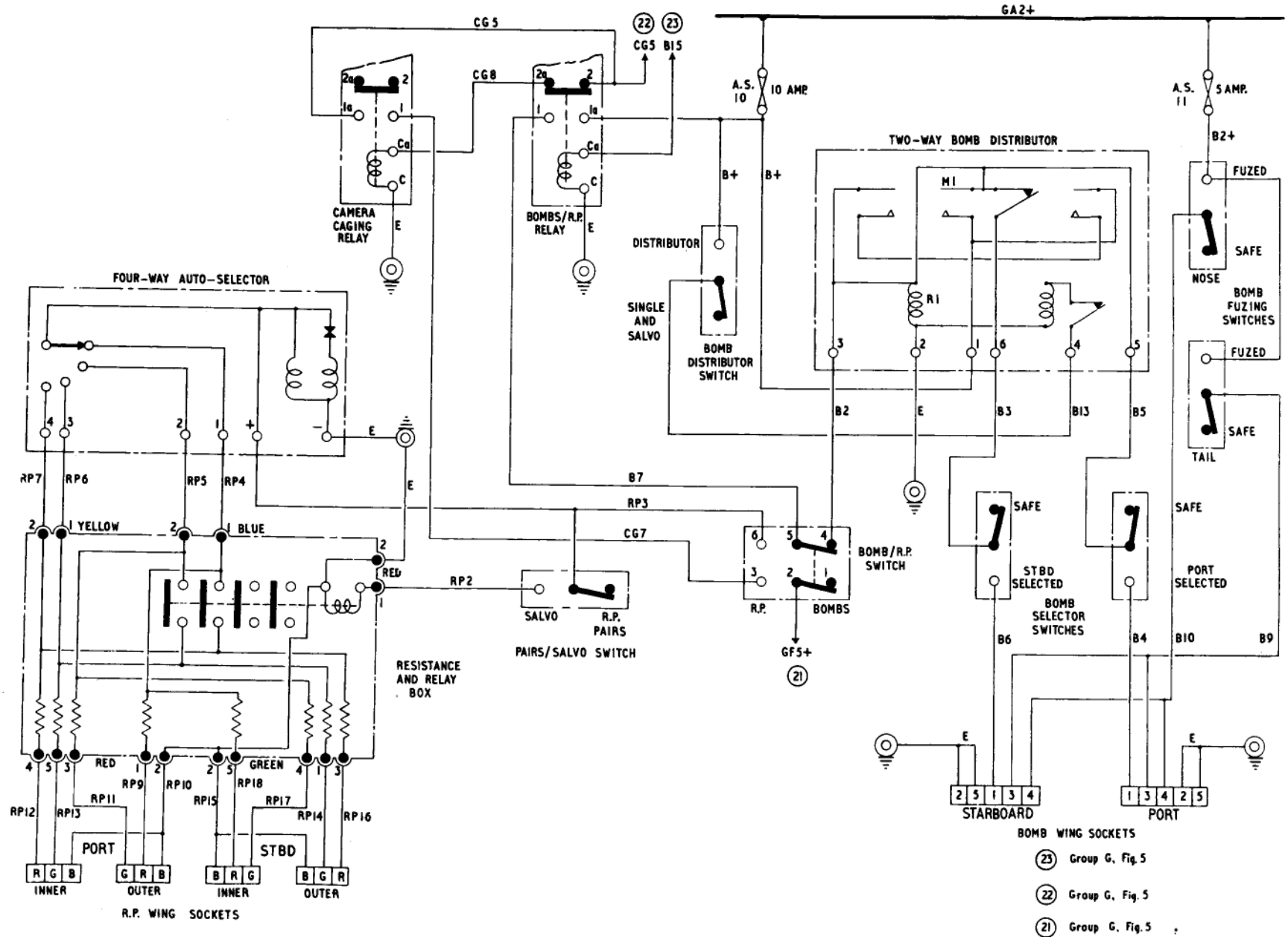


Fig. 8. Bombs/R.P. firing theoretical

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