GROUP D—MISCELLANEOUS INSTRUMENTS

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LIST OF ILLUSTRATIONS

Introduction

1. This group contains information related to the miscellaneous instruments fitted to the aircraft; some of the instruments are operated electrically and derive their supplies from the aircraft generator system described in Chap. 1, Group A of this Section. The following list gives the component specialist Air Publication references.

Equipment	Air Publication	Equipment	Air Publication
Accelerometer, Mk.2, Type B6	1275A, Vol.1, Sect.12, Chap.3	Control unit, Type S, Mk.1 (selector/dimmer)	1275E, Vol.1, Sect.7, Chap.1
Brake pressure gauge, Mk.1D	1275A, Vol.1, Sect.15, Chap.9	Control unit, Type P, Mk.2 (Guns/R.P.)	
Cabin altimeter, Mk.18	1275A, Vol.1, Sect.22, Chap.14	Recorder camera, Mk.3	1355D, Vol.1, Sect.3, Chap.2
Gyro gun sight, Mk.5	1275E, Vol.1, Sect.5, Chap.5	Oxygen regulator, Mk.11D	1275A, Vol.1, Sect.2, Chap.3
Control unit, Type T1, Mk.1 (Twist grip)	1275E, Vol.1, Sect.7, Chap.1	Oxygen regulator, Mk.11E	1275A, Vol.1, Sect.2, Chap.6
Control unit, Type RA, Mk.1 (Amplifier)		Oxygen economiser, Mk.4	4343A, Vol.1, Sect.16, Chap.3
Control unit, Type PS, Mk.1 (Guns/MRP/SRP)		Voltmeter, Type 0-35 volts	1275A, Vol.1, Sect.18, Chap.14
		Fuel contents system, Mk.5A	

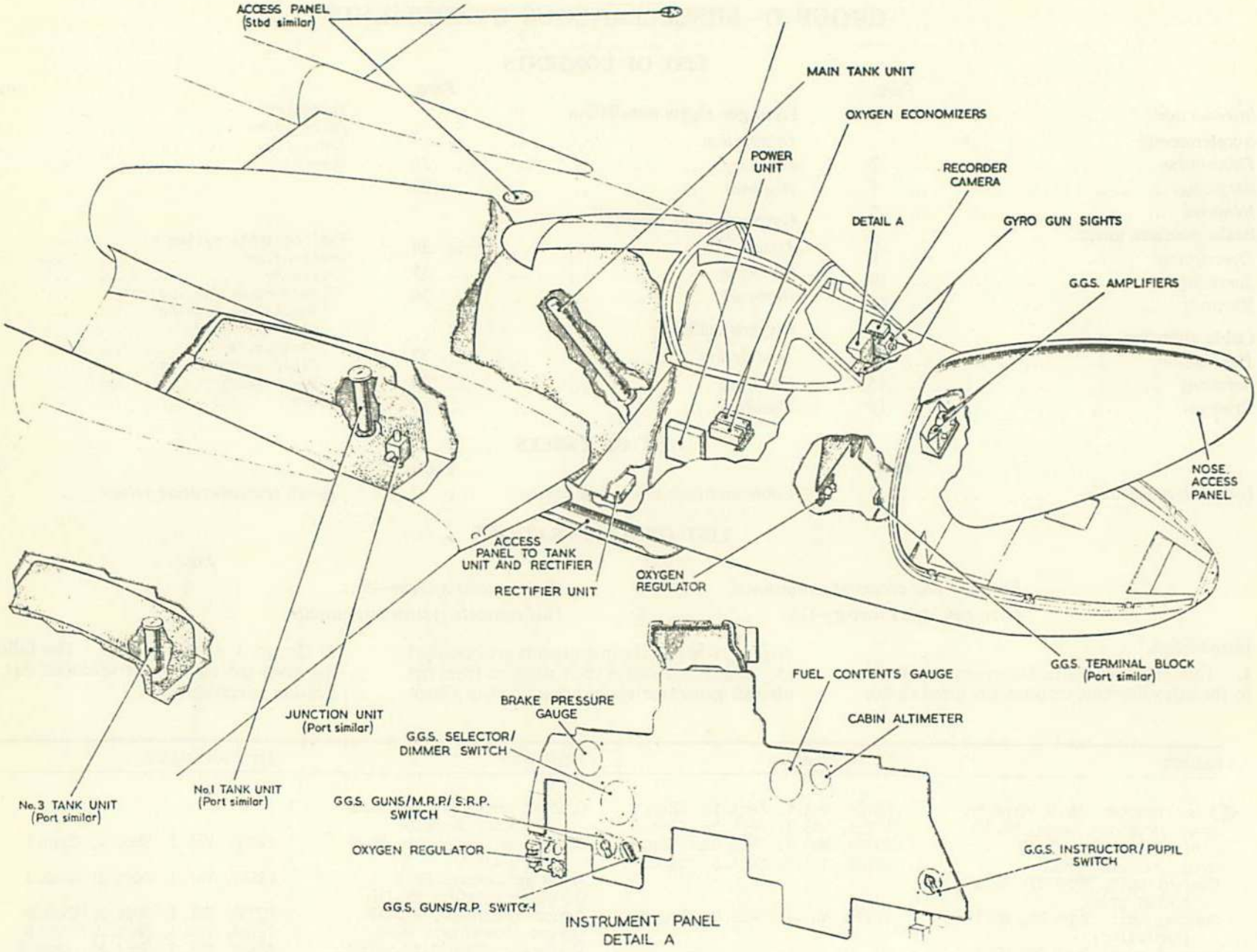

Fig. 1 *Location and access of components*

ACCELEROMETER

Description

2. An indicating accelerometer is fitted to the centre of the upper instrument panel. It provides an indication of acceleration along the plane of the vertical axis of the aircraft, and is calibrated in components of "g"; this being equal to the rate of acceleration due to the earth's gravitational pull.

3. Three pointers are employed, the main one providing instantaneous readings from —5g to +10g, while the remaining two pointers show the maximum "g", positive and negative, respectively, that has so far been experienced. These latter pointers can be reset to the main pointer reading by pushing the reset push at the bottom left-hand side of the dial.

4. When the aircraft is at rest on the ground the main pointer will read +1g, provided that the aircraft is in its flying attitude.

Servicing

5. The instrument is described in the specialist Air Publication contained in the list included in para. 1.

Removal

6. To remove the instrument, the upper instrument panel must first be removed from its fixed position by loosening the two Oddie pins and withdrawing the panel away from its fixed location. The three 4 BA csk/hd. screws securing the instrument panel may then be removed.

Note . . .

Whenever the instrument is removed from the aircraft the weight arms must be locked by rotating the knob, after it has been pulled out, located at the back of the instrument in the appropriate direction, as marked on the instrument case. Also, care must be taken, when handling the instrument, to ensure that no extraneous accelerations are imposed on it.

7. When refitting the instrument it must first be unlocked, then fitted to the instrument panel. Two washers only are required, one being fitted between the panel and the instrument at the bottom right-hand and the top left-hand screw positions.

BRAKE PRESSURE GAUGE

Description

8. A multiple reading gauge is fitted to the instrument panel to show to the pilots the pneumatic pressure available for wheel braking purposes.

9. The gauge employs three bourdon tubes which, through suitable pointer mechanisms, indicate the total pressure in the pneumatic system and the pressure being applied at any instant to the port or starboard brakes, or both, simultaneously. The three resultant dials are calibrated in p.s.i., the main dial reading from zero to 600 p.s.i. whilst the two subsidiary dials read from zero to 200 p.s.i. The pneumatic system is described in Sect. 3, Chap. 7 of this book.

Servicing

10. The gauge is described, together with servicing information, in the specialist Air Publication listed in para. 1. The Appendix 1 to that specialist Publication contains the standard serviceability test for the gauge.

Removal

Warning . . .

The brake pressure gauge pipe unions are NOT to be loosened until the pneumatic system pressure has been exhausted (Sect. 3, Chap. 7).

11. The instrument panel must first be lowered (*Gen. Inf.* para 10 (2) of this Chapter), the pipe unions to the gauge removed (Warning preceding this para.) and the 2 BA screws, and nuts removed. The gauge will then be free for removal from the aircraft.

12. When re-fitting the gauge, ensure that the pipe unions are properly tightened to effect leakproof connections.

CABIN ALTIMETER

Description

13. This instrument is fitted to the instrument panel to indicate to the pilot's the cabin pressure, in terms of altitude, so that they may regulate their oxygen equipment accordingly.

14. As oxygen is not required until 10,000 feet, the instrument range has been calibrated from that figure, the maximum reading being 40,000 feet.

Servicing

15. The altimeter is described, together with servicing data, in the specialist Air Publication listed in para. 1. The standard serviceability test is contained in the Appendix 1 to that specialist Publication.

Note . . .

It is essential that the vent holes in the instrument case are kept clear at all times.

Removal

16. The method of removing the instrument from the aircraft will be self-evident when viewed, the instrument panel first being lowered (*Gen. Inf.*).

GYRO GUN SIGHTS INSTALLATION

Description

17. Each retractable mounting (*Chap.* 1, *Group G*) provides a movable platform for a gyro gun sight, allowing the sight, when not required, to be retracted out of the pilot's view.

18. A twin gun sight installation is provided to allow both pupil and instructor pilots to participate in gyro gun sight training. For this reason both sights may be used concurrently by selection of the individual retraction unit switches, these switches controlling the sights besides actuating the retraction units to their combat positions.

19. The system comprises two gyro gun sights, the ranging of each being applied by the motor fitted to, and forming part of, the

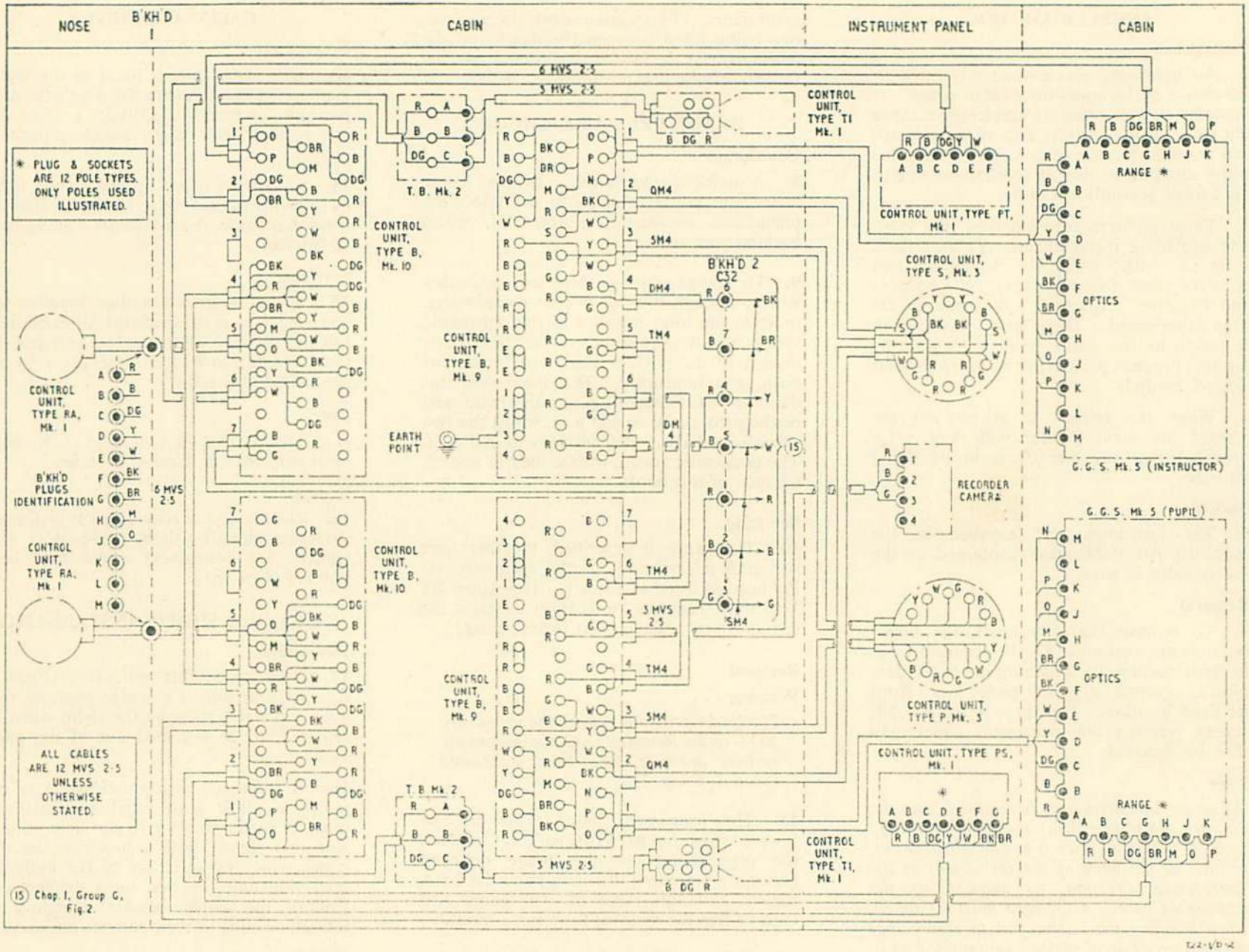

Fig. 2 *Gyro gun sight wiring-GS*

sight. The direction and amount of rotation of the range motor is controlled by the out-of-balance state of a Wheatstone's bridge, the two arms of which are formed by the throttle twist grip potentiometer and the range motor potentiometer, with a sensitive relay assembly contained in the amplifier unit connected across the bridge.

20. Two d.c. supplies are applied to the installation, a 28 volt and a 22 volt, ± 0·5 volt, the latter being regulated to that value as given in Chap. 1, Group G.

21. A selector switch, fitted to the starboard side of the instrument panel, governs which pilot is to apply ranging to the sights, as this switch connects either the instructor or pupil pilots' ranging circuit (*para.* 19) to both sights, simultaneously.

22. A further control, the GUNS/M.R.P./S.R.P. switch, is fitted to the port side of the instrument panel and, when switched to the M.R.P. or S.R.P. position, applies fixed ranging and gravity drop settings to the sight head. The manual ranging from the throttle twist grips is therefore eliminated.

23. The optical display of each sight is controlled by a conventional SELECTOR/DIMMER switch and GUNS/R.P. switch. Both these controls, although appearing to be single units, are twin controls, one half supplying each sight, the two halves being mechanically linked.

24. The brilliancy of the two lamps, housed in each sight head to illuminate the optical systems, is controlled by a rheostat fitted to the SELECTOR/DIMMER switch on the port face of the instrument panel. The selector of this switch provides for conventional FIXED, FIXED and GYRO, or GYRO DAY graticule displays of each sight's optical systems.

25. The GUNS/R.P. switch, when set to GUNS, allows the sight to be used for cannon firing, but when set to R.P. produces a 1 degree drop of the graticule system to allow the bottom graticule diamond display to be used for sighting during R.P. firing. This allows for the much more appreciable gravity drop of a rocket projectile whilst in flight, in relation to that of a cannon shell.

Servicing

26. The components in the ranging system of the gyro gun sight, together with the sight head, are described, together with the servicing, in the specialist Air Publication listed in para. 1. The SELECTOR/DIMMER and GUNS/R.P. switches are similar to those listed, but differ in that they are twin components. The SELECTOR/DIMMER used is classified as a Control unit, Type S, Mk. 3, while the GUNS/R.P. switch used is classified as a Control unit, Type P, Mk. 3. The INSTRUCTOR/PUPIL selector switch is a simple change-over switch, and is classified as a Control unit, Type PT, Mk. 1.

27. An operating test schedule is included in Table 1. This test schedule is not in true operational sequence, but has been devised to check fully every function of the range and optics systems of both sights.

Note . . .

(1) *In tests* 8, 11, 14, 17, 26, 29, 32 *and* 35, *the range drive is a preset value and should take up a position at* 200 *yards.*

(2) *In tests* 9, 12, 15, 18, 27, 30, 33 *and* 36, *the range drive is at a preset value and should take up a position at* 265 *yards.*

(3) *When switching the GUNS/R.P. switch from GUNS to R.P., note that the moving graticule display drops to* 1 *degree below the gun line.*

28. The reflectors, sunscreens and exposed surfaces of the gun sight lenses should be kept clean by wiping with cotton wool lightly damped with carbon tetrachloride, ensuring that no foreign matter exists which may damage the surfaces being cleaned. The silica gel drying cells on the gun sights should be renewed when pink in colour.

Removal

29. To remove either gun sight, or any one of the control units fitted to the instrument panel, both retraction units should be extended to their combat position and the instrument panel lowered (*Gen. Inf.*).

30. To remove a gun sight the relevant circuit breaker on the instrument panel must then be tripped. The range control and gyro-and-optics control plug and socket connections should then be broken, and the star nut holding the gun sight to the retraction unit removed. The sight may then be removed.

Note . . .

The range control and gyro-and-optics control plug and socket connections are interchangeable. The former is therefore marked with RED paint whilst the latter is marked with GREEN paint to aid identification.

31. The four control units fitted to the instrument panel, namely the INSTRUCTOR/PUPIL switch, the GUNS/R.P. switch, the GUNS/M.R.P./S.R.P. switch and the SELECTOR/DIMMER switch, are conventionally fitted, the latter unit being mounted with the aid of four distance pieces.

32. Both relays, which supply the gun sights and retraction units, are mounted to a plate fitted on the cabin floor beneath the instructor pilot's rudder pedal controls. Both these relays are secured to the plate with two 4 BA bolts.

33. Both amplifier units are mounted to a common bracket which is itself anti-vibration mounted to a bracket secured to the forward face of bulkhead 1. Access to the amplifier units is in the nose bay. Each amplifier is secured to the bracket by three of the nuts which secure the amplifier's base plate to the amplifier body.

TABLE 1—G.G.S. test schedule

Note.—Tests 19 to 36, inclusive, are identical to tests 1 to 18, inclusive, except that where, in tests 1 to 18, the word INSTRUCTOR appears, the word PUPIL is substituted for the parallel test in tests 19 to 36 inclusive.

TEST No.	1	2	3	4	5	6	7	8
SELECTOR/ DIMMER SWITCH	FIXED	FIXED	FIXED	FIXED	FIXED	FIXED	FIXED AND GYRO	FIXED AND GYRO
GUNS/M.R.P./ S.R.P. SWITCH	GUNS	M.R.P.	S.R.P.	GUNS	M.R.P.	S.R.P.	GUNS	M.R.P.
INSTRUCTOR/ PUPIL SWITCH	INSTRUCTOR	INSTRUCTOR	INSTRUCTOR	INSTRUCTOR	INSTRUCTOR	INSTRUCTOR	INSTRUCTOR	INSTRUCTOR
GUNS/R.P. SWITCH	GUNS	GUNS	GUNS	R.P.	R.P.	R.P.	GUNS	GUNS
THROTTLE TWIST GRIP	RANGE DRIVE FUNCTIONS FROM INSTRUCTOR'S	NONE	NONE	RANGE DRIVE FUNCTIONS FROM INSTRUCTOR'S	NONE	NONE	RANGE DRIVE FUNCTIONS FROM INSTRUCTOR'S	NONE
G.G.S. SPAN CONTROL	NIL	NIL	NIL	NIL	NIL	NIL	RANGE FUNCTIONS ON BOTH	SET TO R.P.
INSTRUCTOR'S OR PUPIL'S GRATICULES	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME
DIMMER CONTROL	DIMS BOTH	DIMS BOTH	DIMS BOTH	DIMS BOTH	DIMS BOTH	DIMS BOTH	DIMS BOTH	DIMS BOTH
GRATICULES FIXED GYRO	ON OFF	ON OFF	ON OFF	ON OFF	ON OFF	ON OFF	ON ON	ON ON

TABLE 1—G.G.S. test schedule (*continued*)

9	10	11	12	13	14	15	16	17	18
FIXED AND GYRO	FIXED AND GYRO	FIXED AND GYRO	FIXED AND GYRO	GYRO	GYRO	GYRO	GYRO	GYRO	GYRO
S.R.P.	GUNS	M.R.P.	S.R.P.	GUNS	M.R.P.	S.R.P.	GUNS	M.R.P.	S.R.P.
INSTRUCTOR	INSTRUCTOR	INSTRUCTOR	INSTRUCTOR	INSTRUCTOR	INSTRUCTOR	INSTRUCTOR	INSTRUCTOR	INSTRUCTOR	INSTRUCTOR
GUNS	R.P.	R.P.	R.P.	GUNS	GUNS	GUNS	R.P.	R.P.	R.P.
NONE	RANGE DRIVE FUNCTIONS FROM INSTRUCTOR'S	NONE	NONE	RANGE DRIVE FUNCTIONS FROM INSTRUCTOR'S	NONE	NONE	RANGE DRIVE FUNCTIONS FROM INSTRUCTOR'S	NONE	NONE
SET TO R.P.	RANGE FUNCTIONS ON BOTH	SET TO R.P.	SET TO R.P.	RANGE FUNCTIONS ON BOTH	SET TO R.P.	SET TO R.P.	RANGE FUNCTIONS ON BOTH	SET TO R.P.	SET TO R.P.
SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME
DIMS BOTH	DIMS BOTH	DIMS BOTH	DIMS BOTH	DIMS BOTH	DIMS BOTH	DIMS BOTH	DIMS BOTH	DIMS BOTH	DIMS BOTH
ON ON	ON ON	ON ON	ON ON	OFF ON	OFF ON	OFF ON	OFF ON	OFF ON	OFF ON

GYRO GUN SIGHT RECORDER

Description

34. Provision is made to fit a recorder camera to the pupil pilot's gun sight to effect a photographic record of the target and of the moving graticule of the sight itself. The camera is actuated from the cannon firing push-switch on either control column handle.

Servicing

35. All servicing, including installation and loading of the magazine, is described in the specialist Air Publication listed in para. 1.

Removal

36. The recorder camera is spring-clipped to two side clips screwed to the pupil pilot's gun sight. The electrical connection between the camera and the supply socket fitted to the retraction unit is effected by use of an adaptor supplied with the camera, the adaptor three-pole socket engaging with the retraction unit plug, and the adaptor telephone socket engaging with the camera telephone plug.

OXYGEN INDICATOR

Description

37. An oxygen high pressure indicator is fitted to the pupil pilot's Mk. 11D regulator, together with an ON/OFF wheel valve and a high and low pressure flow gauge. The instructor pilot's oxygen regulator is a Mk. 11E, having no indicator or wheel valve.

38. The regulators are fitted one either side of the cabin below the main instrument panel, whilst the two Mk. 4 oxygen economizers are located on the cabin floor aft of the pupil pilot's ejection seat. The oxygen system is described in Sect. 3, Chap. 10 of this book.

Servicing

39. The oxygen system components detailed above are described, together with the servicing instructions, in the specialist Air Publication listed in para. 1.

Warning . . .

Under no circumstances must OIL or GREASE be applied to any part of the oxygen system.

Removal

40. The method of removal of each component will be self-evident when viewed on the aircraft, and should only be effected in collaboration with the airframe tradesman. The pupil pilot's ejection seat will first have to be removed to provide access to the economizers.

VOLTMETER

Description

41. A coloured-sector voltmeter is fitted to the main instrument panel to show the d.c. voltage available at all times.

42. When the aircraft engine is idle, and the cut-out consequently open, the voltmeter will indicate the main batteries' voltage. When the engine is running, however, the cut-out will be closed, and the instrument will then show the voltage output of the engine-driven d.c. generator.

Servicing

43. The description of the voltmeter is contained in the specialist Air Publication listed in para. 1.

Removal

44. Removal will be self-evident when the instrument is viewed on the aircraft, the main instrument panel first being lowered (*Gen. Inf.* para 10 (2) of this Chapter).

FUEL CONTENTS SYSTEM

Description

45. A Mk. 5A Pacitor fuel contents system is installed incorporating provision for empty and full calibrations of the rectifier unit besides the zero adjustment at the back of the indicator. The indicator is calibrated in mass units (lb.).

46. The system is based upon the fact that, all other factors remaining unchanged, the capacitance of a capacitor depends upon the dielectric constant of the substance between the plates.

47. The tank units, of which there are five in the system, utilize the air, fuel or both as their dielectric, and are consequently variable capacitors.

48. They are located one in each wing tank No. 1, one in each wing tank No. 3, and one in the main (fuselage) tank. The collective fuel contents of these tanks is depicted by the total capacitance of the tank units, the resultant current being applied through the deflector coil of a ratiometer, the control coil being supplied with a steady current.

49. The system incorporates a power unit which converts the aircrafts 24-volt d.c. to approximately 70-volts, 19·1 kc/s a.c. for application to the tank units. A rectifier unit then transforms and rectifies the a.c. back to d.c., and applies both the control and deflector currents to the ratiometer indicator.

Servicing

50. The Mk. 5A Pacitor fuel contents system is described, together with general servicing information, in the specialist Air Publication listed in para. 1.

Note . . .

The co-axial cables interconnecting the rectifier unit and the tank units must at no point have a bend radius of less than 4 *inches.*

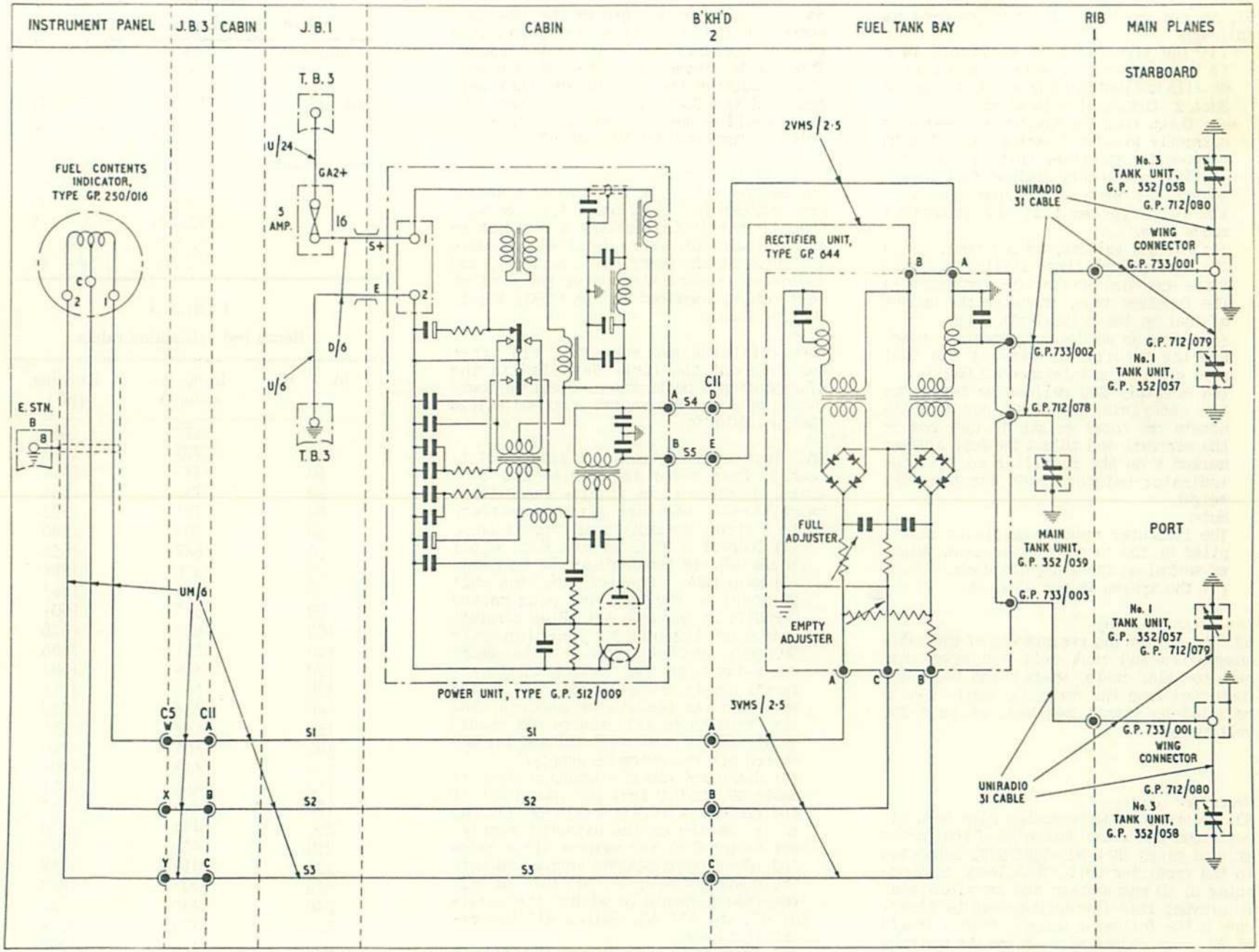

Fig. 3. Fuel contents system – S

Setting up the indicator

51. To set up the indicator proceed as follows:-

(1) The aircraft must be rigged in a ±5 degree nose up attitude. Rigging details and instructions are contained in Sect. 2, Chap. 4 of this Volume.

(2) Check that the system as a whole is correctly wired and switch ON. Allow 20 minutes for the power unit to warm up.

(3) With completely drained fuel tanks, adjust the empty trimmer (marked E) on the rectifier so that the indicator reads zero.

(4) Put 200 gallons, ±4 per cent., into the aircraft by first filling the wing tanks and then putting the remainder in the fuselage tank, checking the amount of fuel on the refueller's gauge.

(5) Using an accurate hydrometer, measure the specific gravity of the fuel used within the tolerance ±0.002.

(6) Multiply 200 gallons by ten times the ascertained S.G. of the fuel to obtain the total weight of fuel now in the aircraft and adjust the fuel trimmer marked F on the rectifier so that the indicator pointer reads exactly this weight.

Note...

The indicator reading should be multiplied by 100 to read the correct weight as marked on the indicator face.

(7) The system is now aligned.

Insulation testing

52. The insulation resistances of the cable assemblies and tank unit measured from each co-axial cable, where it has been disconnected from the rectifier unit, should be not less than 5 megohms, using a 250 volt megger.

Rectifier units

53. Incorrect gauge readings have been experienced due to the weakening of the spring grip of plugs (Ref. No. 10H/3930) connected to the rectifier unit. This leads to loosening or disconnection due to vibration. To prevent this the spring must be tightened in the following manner. Wind a length of 20 gauge copper wire around the indented ring in the spring grip and twist the two ends until a firm grip is made.

Tank units

54. Ingress of water through the tank connector at the cable gland entry has also caused incorrect readings on the gauge. This can be prevented by the use of a seal placed between the face of the tank unit head and the face of the cable end. The seal should be made of tank material using jointing compound (Ref. No. 34B/523).

Fault location tests

55. General notes, in the form of a Table, are included in A.P. 1275A, Vol. 1, Sect. 3, Chap. 17 to help in locating a fault shown at the indicator. A more detailed procedure for checking the power unit, rectifier, and indicator, separately, using the Pacitor test set, is described in A.P. 1275T, Vol. 1, Sect. 5, Chap. 3.

Note...

When refitting the rectifier lid after carrying out the tests detailed in the aforementioned publication, treat the Dowty O-ring seal with Kingsnorth compound No. 1026 (Ref. No. 33C/810).

56. A test is also given in A.P. 1275T, Vol. 1, Sect. 5, Chap. 3 for the cables and tank units. As these tests require capacitance calculations, they are given hereafter, Table 2 giving the individual capacitances.

(1) Connect a 26 to 28 volt d.c. supply to the D.C. IN terminals of the test set.

(2) Main tank: Connect junction unit GP. 30694 to the co-axial plug marked CAPACITY on the test set. Plug aircraft cable GP. 712/078 to junction unit GP. 30694, and set switch C to the nearest value below 191. Switch on the external supply, press the FREQ. CAP. switch and note the reading on meter A. Add this reading to 191; the result should be within the limits of 213 and 191 pF. Switch off the external supply.

(3) Starboard tanks: Disconnect aircraft cable GP. 712/078 from the junction unit and connect aircraft cable GP. 733/002 to it. Switch on the external supply, set switch C to the nearest value below 582, press the FREQ. CAP. switch and note the reading on meter A. Add this to 582; the result should be within the limits of 616 and 582 pF. Switch off the external supply.

(4) Port tanks: Disconnect aircraft cable GP. 712/002 from the junction unit

TABLE 2

Cable and tank unit capacitances

Component	Part No. GP	Capacitance (pF)
Tank unit	352/059	159—147
	352/058	106— 98
	352/057	86— 80
Cable assembly	733/003	150—145
	733/002	98— 93
	733/001	45— 40
	712/080	220—215
	712/079	61— 56
	712/078	54— 44

TABLE 3

Bench test calibration values

lb. × 10	Indicator (ohms)	Rectifier (pF)
0	777	1468
10	773	1472
20	757	1488
30	738	1506
40	721	1523
50	704	1540
60	687	1558
70	676	1568
80	662	1583
90	645	1601
100	623	1626
110	597	1656
120	576	1684
130	553	1711
140	536	1734
150	518	1756
160	501	1780
170	483	1806
180	466	1831
190	449	1857
200	434	1880
210	421	1902
220	410	1918
230	402	1932
240	392	1950
250	382	1968
260	376	1980
270	356	2020

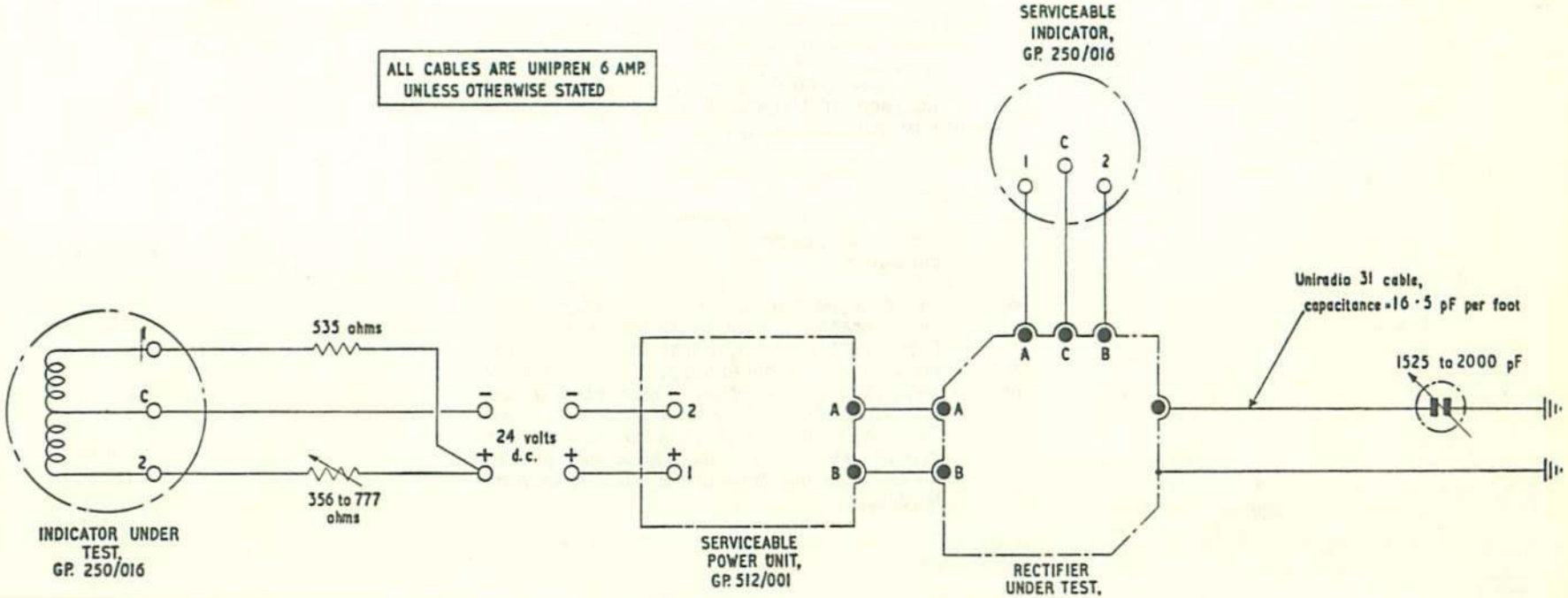

Fig. 4 *Fuel contents system test circuits*

and connect aircraft cable GP.733/003 to it. Switch on the external supply, set switch C to the nearest value below 634, press the FREQ.CAP. switch and note the reading on meter A. Add this to 634; the result should be within the limits of 688 and 634 pF. Switch off the external supply.

57. If these three tests have proved satisfactory all cables and tank units are serviceable. The test set may then be removed from the aircraft and all aircraft cables reconnected to the rectifier.

58. If any of the three tests have proved faulty, reference should be made to Fig.3 and each cable tested separately, being disconnected at each end for this purpose. The cable capacitances are shown in Table 2.
Note...
On satisfactory completion of the foregoing tests the system must be reset as detailed in the setting up procedure.

Bench tests

59. Table 3 is included to facilitate complete range testing on the bench of the indicator and rectifier unit,

(1) Indicator: Connect an external test circuit, as shown in Fig.4, between the suspected indicator and a stable 24 volt d.c. supply. Adjust the variable resistor to the values shown in Table 3 and check that the indicator reads, over its complete range, the lb. content for the resistance value inserted. If the indicator fails this test it should be renewed.

(2) Rectifier: Connect an external test circuit, as shown in Fig.4, to any coaxial plug of the suspected rectifier. The power unit and indicator must be of tested serviceability. Adjust the variable capacitor to the values shown in Table 3, taking into account the capacitance of the inter-connecting Uniradio 31 cable(16.5 pF per foot), and check that the indicator reads, over its complete range, the lb. content for the capacitance value inserted. If these readings are not obtained the rectifier must be renewed.

Note...
The E and F trimming resistors of the rectifier must be set to their mid-position before calibrating as above. The indicator should read within 2 per cent. of its full scale reading in both the foregoing tests.

Removal

60. The removal of the fuel contents system components will be self-evident when viewed on the aircraft.

61. The instrument panel must be lowered (Gen. Inf.) before the indicator can be removed. The power unit is fitted to the starboard cabin wall by anti-vibration mountings while the rectifier is bolted on the cannon bay roofing.

62. Before removing the main fuel tank unit, the tank must be drained. The tank unit is secured by twelve pinnacle nuts to the underside of the tank and is accessible in the port side of the fuel tank bay adjacent to the immersed fuel booster pump.

63. The wing tank units are fitted to their respective tanks in a similar manner to the main tank unit. They are, however, accessible from the top of each wing via access panels.

64. When re-fitting any tank unit a new gasket made up from plain Hallite, Aero, D.T.D. 378A (Ref. No. 32B/689) should be fitted; no sealant is necessary. Seal the tank connector cable after connection using Boscoprene No. 2100 (without hardener) around the milled nut, and replace the rubber sleeve. When replacing the access panels to the wing use Boscoprene No. 2100 (without hardener).