

POST OFFICE TELECOMMUNICATIONS HEADQUARTERS

SPECIFICATION S 1121A

FOR

PUSH BUTTON UNIT NO 3A, B, C AND DDRAWING NO 93090

I N D E X

1. DESCRIPTION
2. GENERAL
3. CONSTRUCTION
4. PERFORMANCE
5. SIGNALLING PERFORMANCE
6. INSULATION RESISTANCE
7. RELIABILITY AND ENDURANCE
8. MARKINGS
9. REFERENCES

1. DESCRIPTION

1.1 The push button unit is suitable for use with polarised DC leg signalling system (Code C). The depression of a button presents to the A and B wires of the telephone line the DC conditions shown in Figure 2.

1.2 Push Button Unit No 3A is for use with Telephones SA 4252, 1/SA 4252 and 2/SA 4252.

1.3 Push Button Unit No 3B is for use with Telephone 3/SA 4252.

1.4 Push Button Unit No 3C is for use with Loudspeaking Telephone SA 4255.

1.5 Push Button Unit No 3D is for use with push button units 1/SA 4259 and 2/SA 4259.

1.6 Each push button on the unit when depressed operates two make contacts and two common contacts, one make and one break.

1.7 Push Button Unit No 3C has available for operating with each button, a further common make springset.

2. GENERAL

2.1 Specification D 1000 shall be taken as forming part of this Specification.

2.2 When specifications exist for individual components of the unit the components shall be in accordance with those specifications.

3. CONSTRUCTION

3.1 The push button unit shall be constructed in accordance with Drawing 93090 and connected in accordance with the appropriate diagram referred to on that drawing.

3.2 No part of the push button unit shall be lubricated, except as indicated on the drawing.

4. PERFORMANCE

4.1 The total travel of each push button shall exceed 2.7 mm and shall have a pronounced collapsing action, ie, the operate force shall reach a maximum before the button has travelled 2 mm and shall then reduce by a least 50 gf.

4.2 The make contacts associated with any button shall not make until the button has travelled 0.25 mm from its normal position.

4.3 The common make and break contacts shall not operate until the make contacts referred to in par. 4.2 have operated and once operated, shall restore fully before them.

4.4 The make springset referred to in 1.7 when fitted shall operate before the common make and break contacts referred to in 4.3. Once operated it shall restore after the common make and break contacts have restored.

4.5 All make contacts except those referred to in par. 1.7 unless of micro-switch construction shall have:-

4.5.1 A gap of a least 0.25 mm between contacts when normal.

4.5.2 Twin contact surfaces, independently tensioned so that they make simultaneously as far as can be judged by eye and so that when either pair of contact surfaces is parted by at least 0.25 mm the other pair shall not separate.

4.5.3 A wiping action giving at least 0.08 mm relative motion between contact surfaces after they have been brought into contact.

4.6 The combined contact force of the twin make contacts referred to in par. 4.5 shall be at least 50 gf when operated, measured just forward of the contact surfaces towards the free end of the spring.

4.7 A push button shall not operate when a force of 200 gf is applied centrally on the button face in line with the direction of travel. It shall operate when this force is increased to a maximum of 440 gf and shall be maintained in its operated state when this force is decreased to 285 gf. The button shall restore when the force is reduced to a minimum of 70 gf.

4.8 The range of operating forces of all the push buttons in any one push button unit shall not exceed 120 gf.

4.9 The digit and common make springset contacts shall have stabilized before the microswitches operate. The total duration of bounce when contacts make or break on the microswitches shall not exceed 2.5 ms.

4.10 The sequencing of the microswitch contacts shall be such that the break contact breaks before the button has travelled 2 mm and the make contact makes subsequently and before the button has travelled 2.4 mm. (With normal operation of the button this setting will give a timing sequence of the make contacts making within 5 ms of the break contact breaking).

4.11 The microswitch contacts shall have operated before the button has reached within 0.3 mm of its full travel.

4.12 The springset referred to in par. 1.7 shall have a minimum contact force of 15 gf when operated.

5. SIGNALLING PERFORMANCE

5.1 The completely assembled unit shall be capable of passing a simple signalling test to prove the correct connexion of components and freedom from gross component faults.

6. INSULATION RESISTANCE

6.1 The resistance measured between points which are required to be electrically isolated shall be not less than 5 megohm when measured with 250 volts DC.

7. ENDURANCE AND ERROR RATE

7.1 Qualification Approval

7.1.1 Items will be required for qualification approval initially and thereafter at yearly intervals. Each item will be subjected to a visual and mechanical examination together with a check of contact resistance before the tests. The measured contact resistance shall not exceed the pole resistance by more than 10 milliohms. The method of measurement will be in accordance with Specification D 2156, Section 3.5. (Definition:- The pole resistance is that part of the measured contact resistance from the points of measurement to the contact areas. Thus the difference between the measured contact resistance and the pole resistance is the resistance at the point of contact.) Any item not conforming to specification must be replaced.

7.1.2 The items will be subjected to a total of 120,000 button operations (10,000 on each) under the test conditions specified in para 7.3. The output of the push-button unit will be monitored and a count maintained of the number of incorrect signals sent.

7.1.3 Endurance After the test described in 7.1.2, the unit shall be checked for compliance with each of the following requirements:-

7.1.3.1 Each push-button shall operate with an applied force of not more than 500 gf and shall then release with an applied force of not less than 60 gf. The force shall be applied as described in 4.7.

7.1.3.2 The combined contact force of the twin make contacts measured as described in 4.6 shall be at least 40 gf.

7.1.3.3 The requirements described in 4.10 shall be met.

7.1.3.4 The contact resistance measured as described in 7.1.1 shall not have increased by more than 10 milliohms.

Non-compliance with one or more of these requirements is termed a failure of the push-button unit. Not more than 10 per cent of the units shall have failed at 120,000 operations and the product shall be shown to meet this requirement with at least 90 per cent confidence using a suitable sampling and assessment technique.

In order to obtain data on the number of operations to failure, tests may be interrupted at intervals to check whether or not the failure criteria have been reached. Likewise tests may be extended beyond 120,000 operations to determine the pattern of failure. Any unit failing at an intermediate check point shall be withdrawn from the test but counted in the total number of failures.

7.1.4 Error rate The error rate shall not exceed 1 in 1.2×10^6 operations, an error being defined as the sending of an incorrect signal on the operation of a button. When tested to 120,000 operations as described in 7.1.2 the product shall be shown to meet the error rate requirement with at least 90 per cent confidence using a suitable sampling and assessment technique. Any unit failing the endurance test of 7.1.3 at an intermediate check point shall be withdrawn and a new unit substituted. The number of operations during which the withdrawn unit was known to comply with the requirements of 7.1.3 may be counted towards demonstrating achievement of the error rate.

7.1.5 After completing the endurance test the items will be exposed to an atmosphere containing 25 ± 5 parts per million oxides of sulphur calculated as sulphur dioxide and 3,000 p.p.m carbon dioxide. The atmosphere will be produced by burning coal gas enriched with carbon disulphide vapour and the products of combustion diluted with clean air. The duration of the test will be 20 days continuous exposure. The temperature of the test will be $25 \pm 2^\circ\text{C}$ and the relative humidity will be 75 ± 5 per cent. The contact resistance will again be measured and on the second closure the measured contact resistance shall not have increased by more than 15 milliohms above that obtained in 7.1.3.

7.2 Production Tests

7.2.1 The manufacture shall conduct tests monthly to demonstrate continued compliance with the endurance and error rate requirements of 7.1.3 and 7.1.4.

Any push-button unit subjected to the endurance or error rate test but not then meeting the requirements of this specification shall be replaced.

The method of sampling and assessment and the action to be taken on failure of a sampling test shall be agreed with the PO Inspecting Officer.

Test records shall be maintained and made available to the PO Inspecting Officer.

7.3 Electrical Test Conditions The tests specified in 7.1 and 7.2 shall be carried out with the push-button unit connected in the circuit shown in Fig 1.

8. MARKINGS

The unit shall be marked in the position shown on the assembly drawing with the PO Stock list number, the approved code letters identifying the manufacturer and the last two figures of the year of manufacture followed by the mark number, eg 3A FHB 99/1.

9. REFERENCES

Drawings

93090

Specifications

D 1000

D 2156

END OF SPECIFICATION

TD2.3.2/4675/2

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X 20802/TD

G P

SIGNAL DETECT ELEMENT FOR POLARISED
D.C. LEG SIGNALLING SYSTEM.

NOTES

1. RELAY A IS PART OF THE LINE CCT. AND OPERATES TO THE TELEPHONE LOOP. IT RELEASES AT EACH DEPRESSION OF A PUSH BUTTON. RELAYS AA & AB ARE OPERATED THROUGHOUT THE SIGNAL RECOGNITION PERIOD, BUT RELAY AA RELEASES BEFORE, AND RELAY AB RELEASES AFTER, A BUTTON IS RELEASED.

2. RELAYS WA, XA, YA AND ZA ARE SLAVE RELAYS TO W, X, Y AND Z AND ARE USED TO FORWARD INFORMATION TO THE STORE.

3. ASSUME ZERO LINE LENGTH FOR TEST PURPOSES.

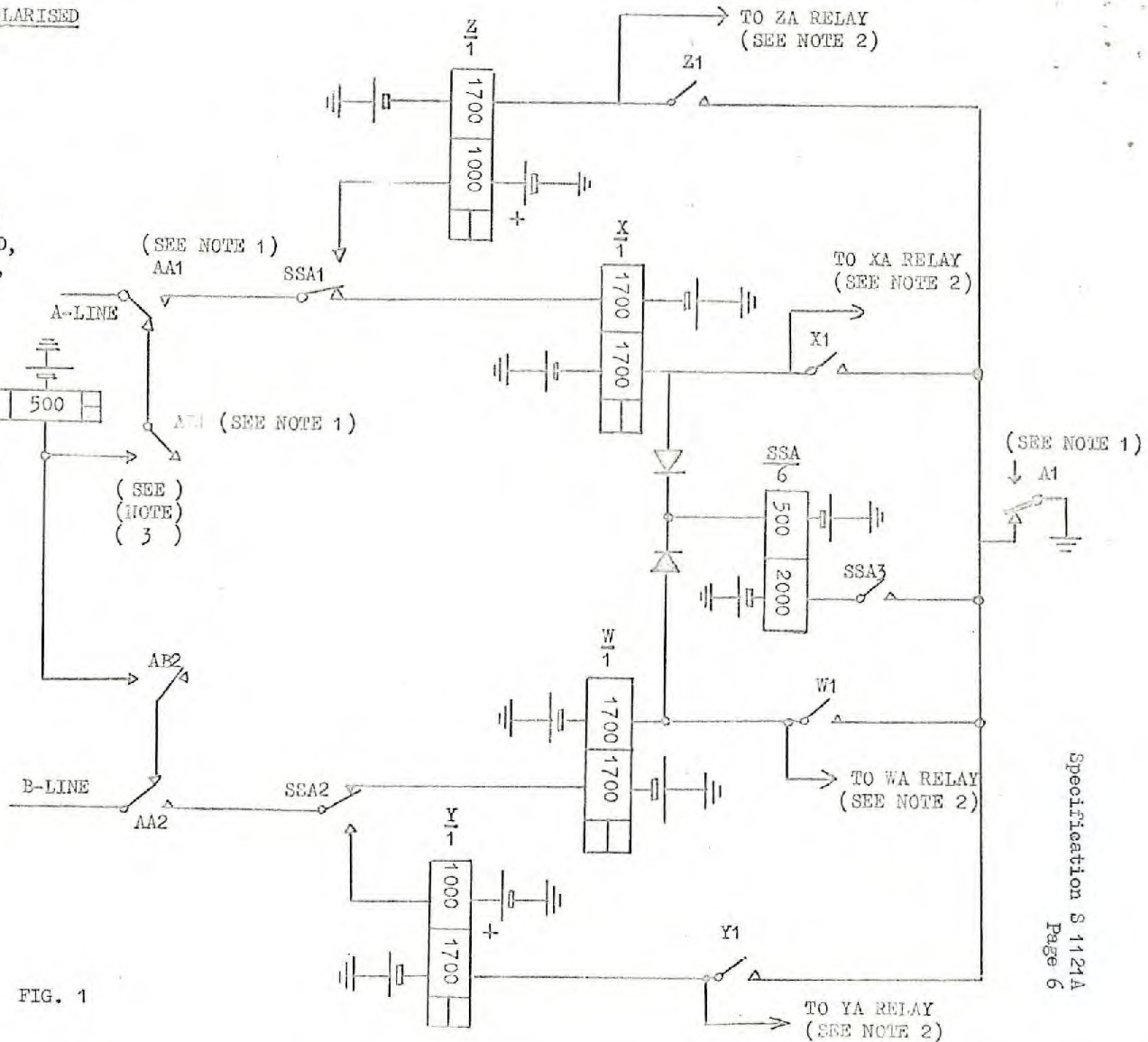


FIG. 1

X 20802/MD

CONDITIONS REQUIRED ON
EACH PUSH BUTTON

KEY	D.C. LEG	
	B. LEG	A. LEG
1		DIS
2	DIS	
3		
4		DIS
5		
6		
7		
8	DIS	
9		
0		
*		
#		

FIG. 2