

POST OFFICE ENGINEERING DEPARTMENT

SPECIFICATION

FOR

TELEPHONE NO. 728LDIAGRAM NO. N 828

1. GENERAL

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

1.2 Where specifications exist for individual components of the telephone the components shall be in accordance with those specifications.

2. DESCRIPTION

Telephone No. 728L is a development from a Telephone No. 710. A push-button keyset is fitted in place of a dial and the enlarged hole in the cover of the telephone is fitted with an escutcheon plate which is held in place by four springs on the inside of the cover. An oscillator unit is mounted on a special bracket which clips between the gravity switch brackets. The telephone is for use with the Push Button Telephone System No. 1 (VF 1/4 + 1/4 code signalling).

3. CONSTRUCTION

3.1 The telephone shall be assembled in accordance with, and from the parts detailed on the assembly drawing.

3.2 The colour of the separate mouldings of the telephone shall match each other to the satisfaction of the Engineer-in-Chief.

3.3 Approved diagrams showing the electrical connexions of the telephone shall be fixed, or reproduced by an approved process, in the positions shown on the assembly drawing. They shall be protected by a coat of varnish, except when impact adhesive labels are used.

3.4 The handset cord shall emerge from the left-hand cord outlet, as viewed from the front of the telephone, in such a way that the helix leads out naturally to the left-hand side of the telephone (as viewed from the front).

3.5 The regulator shall be inserted in the jack of the telephone in the operative position.

3.6 The spring clips fastening the capacitor and induction coil shall be fully home in the appropriate recesses in the moulded base. The induction coil clip shall secure the coil firmly to the base plate; movement of the coil within the mounting should be kept to a minimum. When there is a possibility of accidental contact between the induction coil tags and the gravity switch tags, the induction coil tags may be set slightly. Alternatively the tags may be sleeved.

3.7 The carbon resistors shall be formed to lie at least 0.125 in. clear of the bell armature.

3.8 When the two securing lugs on the push button keyset are fitted squarely in the slots in the bell gong link plate and the push button keyset is swung freely into position against the gravity switch bracket, the mating surfaces at the fixing points shall be not more than 0.062 in. apart and the fixing holes shall be in line. Slight adjustment of the projections on the push button keyset is permissible to achieve this condition.

4. ADJUSTMENT

4.1 Gravity-Switch mechanism

(a) The handset, when resting within the cradle of a completely assembled telephone, shall push the plungers down to the limits of their travel, i.e. until the undersides of the plunger heads rest on the upper surface of the main frame bracket.

(b) A $4\frac{3}{4}$ oz. weight placed across the plungers shall fully depress them as in 4.1 (a).

(c) With an 0.055 in. flat gauge between the plunger tip and the side plate mating face, all latched springset operating plungers shall have been released (i.e. $\frac{3}{4}$ movement of cradle).

(d) Pressure against the plunger bracket latch face due to the latch assembly shall not be more than 50 gm. or less than 35 gm. when measured under the release latch bracket of the latch assembly.

(e) The plunger bracket shall be free on its pivots and correctly located in bearing slots such that a nominal side play of 0.005 in. exists, and in the completely assembled telephone the plungers shall rise to the limits of their movement. Setting of the arms to meet these requirements and to compensate for tolerance variations is permitted.

(f) The tip of the gravity-switch latch spring, in its normal position, shall have visible clearance from the plunger bracket when the latter is at the adverse limit of any play on its pivots. When the latch spring is engaged with the plunger bracket the gravity-switch contacts shall be in the handset-on condition when tested electrically. Full downward movement of the plungers shall allow the latch spring to return to normal. The upper extremity of the latch spring when unoperated shall lie flat, with a definite pressure, on the gravity-switch bracket vertical support and shall return to this position after the lower end of the spring has been pressed flat against the bracket and released.

4.2 Gravity Switch Springset. The individual springs in the spring-set are referred to by their number from the mounting bracket.

(a) Twinning of contacts shall be complete on either side of the buffer spring in the relevant handset on or of position.

(b) Setting or bowing of springs to achieve correct adjustment is permissible.

(c) Alignment of contacts in electrical contact shall not be more than $\frac{1}{3}$ rd of a diameter out of alignment when judged visually.

(d) Total pressure of moving spring against buffer spring shall not be less than 30 gm. with not less than 10 gm. on any one contact measured adjacent to contact dome.

(e) Contact domes shall have a minimum clearance of 0.010 in.

(f) Sequence of operation. When handset is lifted spring contacts 4 and 5 shall make clearly before spring contacts 2 and 3.

(g) The springset clip shall be tensioned so that the cradle bracket shall fully return on removal of the handset. No contact action shall take place with 0.062 in. or less travel of plunger tips. A $1\frac{3}{4}$ oz. weight across the plungers shall be insufficient to break contacts 4 and 5 of the gravity switch springset. The changeover contacts shall not bunch.

5. PLUNGERS (Springset operating)

5.1 The plungers when operated to the latched position shall have travelled 0.125 in. min.

5.2 Plungers shall be free acting and the return spring shall seat flat on both retaining faces.

6. LATCH ASSEMBLY

6.1 Stop lugs at each end should both rest on mounting plate with permissible deviations of 0.004 in. max.

6.2 The latch plate shall pivot freely over the working arc and shall latch and release when an 0.010 in. flat gauge is placed between the right angle seating lugs of the latch plate and the appropriate mating face on the mounting plate.

7. WIRING

7.1 The telephones shall be wired in accordance with the appropriate panels of diagram N 828.

7.2 The wiring shall be carried out with $6\frac{1}{2}$ lb. P.V.C. No. 3 single (Specification CW 109). Laced cable forms are unnecessary provided that the wires are formed to lie neatly. There is no obligatory colour scheme.

7.3 The wiring from the gravity switch springset shall be formed downwards to avoid possible contact with the plunger bracket.

7.4 The oscillator unit connexions shall be made with standard P.V.C. insulated wire $7/.0076$ in. or $25/.004$ in., to Specification CW 109 or Specification CW 78, soldered to the oscillator terminals and connected to the telephone terminals with suitable spade tags. The connexions shall be formed to avoid the possibility of contact with the bell gongs. The colours of the unit connexions shall conform to Diagram N 828, Panel 2.

7.5 The push button keyset connexions to the oscillator unit shall be made with standard P.V.C. insulated wire $7/.0076$ in. to specification CW 109. The connexions shall be made by soldered joints. The wiring form shall be laced, secured at each end and formed so as to avoid possible contact with the bell gongs. The colours of the connexions shall be in accordance with diagram N 828, Panel.2.

8. BELL ADJUSTMENT

When the armature is resting on either of the pole faces the clearance between the hammer and the bell gong shall be not less than 0.015 in., the gongs being adjusted to give optimum ringing under the limiting circuit condition as stated in Specification S 81. The adjustment of the bell gongs, Nos. 24A and 24B shall be such that the code marking is pointing towards the back of the telephone. The bell of the hammer shall strike the gong 0.062 in. above the bottom edge. This adjustment should be obtained by bending the bell hammer rod.

9. PUSH BUTTON UNIT

9.1 The push button unit shall be assembled in accordance with and from the parts details on the assembly drawing.

9.2 The terminals shall be an interference fit in the holes in the push button keyset frame and the terminal numbers shall be clearly signwritten on the front of the frame.

9.3 The button tops shall be an interference fit on the button plungers.

9.4 The total travel of the buttons shall not exceed 0.150 in.

9.5 A button shall not operate when a pressure of 10 ozs. is applied centrally on the button face in line with the direction of travel when the keyset is held at an angle of 30° from the horizontal with the key faces uppermost. (This represents the angle at which the keyset, when mounted in a telephone, is presented to the user).

9.6 A button shall operate when a pressure of 12.5 ozs. is applied as detailed in para. 9.5.

9.7 The pressure required to maintain a button in its operated position shall not be greater than 9.6 ozs. The button shall release when this pressure is reduced to 5 ozs. The pressure shall be applied as in para. 9.5.

9.8 The make contacts associated with any button shall not make when the button has travelled 0.015 in. from the normal position but shall make when the button has travelled 0.035 in.

9.9 The micro switch operating bracket shall be free, without excessive play, on its pivots.

9.10 There shall be a gap of at least 0.005 in. between the tip of any button plunger and the micro switch operating bracket when all buttons are normal.

9.11 The micro switch shall not operate when any button has travelled 0.065 in. from the normal position but shall have operated when any button has travelled 0.120 in.

9.12 The micro switch shall release when a button, once operated, is allowed to restore to within 0.036 in. of its normal position.

9.13 All make contacts shall have a gap of at least 0.010 in. when normal.

9.14 All make contacts shall have a contact pressure of at least 15 gms. when operated.

9.15 The characters on the button face shall be the shape and size shown on Drawing No. SD 98. The letters shall be black and the figures red. The letters shall be in the upper half, and the figures in the lower half, of the button face.

10. OSCILLATOR UNIT

10.1 The oscillator shall be assembled in accordance with and from the parts detailed on the assembly drawing. The unit shall be mounted on a removable bracket that clips between the gravity switch brackets.

10.2 The D.C. resistance of the oscillator unit shall be such that when the telephone is connected via an artificial line equivalent to 3.75 miles of $6\frac{1}{2}$ lb. cable to a $200\Omega + 200\Omega$ Stone transmission bridge a minimum current of 25 mA shall flow when any push button is operated and the telephone handset is off the rest. This condition should apply when the supply voltage is 46 volts.

10.3 The oscillator unit when connected to a D.C. supply as described in par. 10.2 shall give sinusoidal outputs at the required level immediately the appropriate button is operated, at the following frequencies:-

| Button operated | Nominal Frequencies in C.P.S. |
|-----------------|-------------------------------|
| 1 | 1209 + 697 |
| 2 | 1336 + 697 |
| 3 | 1477 + 697 |
| 4 | 1209 + 770 |
| 5 | 1336 + 770 |
| 6 | 1477 + 770 |
| 7 | 1209 + 852 |
| 8 | 1336 + 852 |
| 9 | 1477 + 852 |
| 0 | 1336 + 941 |

16. MARKING

The telephone shall be marked in the position shown on the assembly drawings with the P.O. stock list number, the approved code letters identifying the manufacturer and the year of manufacture followed by the mark number e.g:-

728L FHB 99

END OF SPECIFICATION

File Reference S 3450/2

Subscribers Apparatus and Miscellaneous Services Branch,
G.P.O. Engineering Department,
LONDON, W.C.1.

All frequencies shall be $\pm 1\%$ of nominal when the telephone is subject to any temperature in the range -10° to 50°C for 1 hour.

10.4 When the telephone is connected via an artificial line equivalent to 1.5 miles of $6\frac{1}{2}$ lb. cable to a $200\Omega + 200\Omega$ Stone transmission bridge the received level of individual frequencies measured across a 600Ω non inductive resistor connected to the side of the transmission bridge remote from the telephone when the supply voltage is 46 to 52 volts, shall be as follows:-

Frequencies in the band 697 to 941 C.P.S. not more than -9.5 dbm.

Frequencies in the band 1209 to 1477 C.P.S. not more than -8 dbm.

10.5 When the telephone is connected via an artificial line equivalent to 3.75 miles of $6\frac{1}{2}$ lb. cable to a $200\Omega + 200\Omega$ Stone transmission bridge the received level of individual frequencies measured across a 600Ω non inductive resistor connected to the side of the transmission bridge remote from the telephone, when the supply voltage is 46 to 52 volts, shall be as follows:-

Individual signal frequencies not less than -15 dbm.

10.6 The maximum acceptable deviation of level between any two frequencies occurring simultaneously on the operation of a button under either of the limiting line or voltage conditions referred to in par. 10.4 and par. 10.5 shall be 3 db.

11. TRANSMISSION PERFORMANCE

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

12. SIGNALLING RESISTANCE

The resistance of the telephone, with all push buttons in the unoperated position, shall not exceed 200 ohms measured with a line current of 25 mA. For this measurement the handset may be held so that the plane of the transmitter diaphragm departs from the vertical in any direction by up to 45° and the transmitter may be either in the talking or quiet condition.

13. INSULATION RESISTANCE

The resistance measured between points which should be isolated from each other shall not be less than 5 megohms when measured with 250 volts D.C.

14. LUBRICATION

Plunger bracket pivots and latch plate pivots shall be coated with Moly-Listate grease.

15. LIFE TESTING

15.1 Each common springset or micro switch associated with the push button keyset shall be capable of performing 2,500,000 operations and still function electrically and mechanically.

15.2 Each push button on the keyset, and their associated spring sets, shall be capable of performing 250,000 operations and still function electrically and mechanically.

15.3 All other parts of the telephone not having separate specifications shall be capable of 100,000 operations and still function electrically and mechanically.