

## POST OFFICE TELECOMMUNICATIONS HEADQUARTERS

SPECIFICATIONS OF REQUIREMENTS

FOR

SELF-CONTAINED STROWGER PULSINGBATTERY KEYPHONE(TELEPHONE NO. -/764)

## I N D E X

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## 1. GENERAL

1.1 This specification states the basic requirements for a self-contained Strowger pulsing battery keyphone to enable push-button signalling facilities to be offered to Strowger exchange subscribers without the need for special equipment at the exchange.

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

1.3 Where specifications exist for individual components of the telephone, the components shall be in accordance with those specifications. Any MOS integrated circuits shall be in accordance with Specification D 4000.

## 2. DESCRIPTION

2.1 The Telephone 764 shall be based on Telephone 746. It shall be interchangeable with Telephone 746 on at least the following installations:-

Direct Exchange Line (exclusive and shared service) PBX extensions, including C-wire signalling types.

Extension plans, 1A 4, 105/107 main and extensions with or without recall.

Combinations of the above extension plans which do not involve the use of a latching mechanism for the switches.

2.2 The telephone shall contain a push-button unit and Strowger-pulse sender in place of a rotary dial.

2.3 The sender shall accept digital information from the push-button unit. Each digit shall be stored and retransmitted as loop-disconnect pulses without the need for further action on the part of the user. The nominal speed, break/make ratio and interdigital pause shall be 10 pps, 2:1 and 850 ms respectively.

2.4 The sender shall be capable of pulsing out stored digits whilst receiving and storing further digits.

2.5 The sender shall be capable of handling a full ISD number of 18 digits assuming simultaneous pulsing out and keying in of the 18 digits.

2.6 When the handset is on-hook, the sender shall be inoperative.

2.7 When the handset is replaced, the sender shall cease pulsing and the line shall be restored to normal.

2.8 "Flashing" of the gravity switch, with on-hook periods of greater than 100 ms, shall cause cancellation of any digits stored, and shall not cause any misoperation of the sender, for example, unwanted digits shall not be transmitted.

### 3. OPTIONAL FACILITIES

3.1 The design should envisage the possibility of Telephone 740 being required, having a capacity of 4 press-buttons with latching mechanism and 2 lamp fittings.

3.2 Future designs may be required to take line charging currents of not more than 1.5 mA (par 4.6.3). It follows that the charge-switching unit "off" resistance will need to be at least 5 megohm (par 4.6.4.1). This is to enable the batteries of 2 keyphones to be charged from a single line.

### 4. DESIGN

4.1 Operating Conditions. The telephone shall operate satisfactorily and in accordance with the performance requirements of this specification under the following conditions.

4.1.1 Over local lines having loop resistance up to 1000 ohms and having insulation resistance of not less than 50 kilohm from each wire to earth and between wires.

4.1.2 With PO standard transmission bridges with exchange voltages in the range 45-52V.

4.1.3 Over a temperature range  $-10^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$ .

#### 4.2 Construction

4.2.1 No part of the sender, push-button unit, battery or connecting wires shall foul the bell gongs or armature, the gravity switch or any other springset operating mechanism.

4.2.2 The sender, push-button unit and battery shall each be readily replaceable without the need to use a soldering iron. The push-button unit and sender may, however be combined in a single replaceable unit. The sender shall have a protective cover to prevent accidental damage.

### 4.3 Telephone

4.3.1 With the exception of the sender, push-button unit, battery and charging circuit and other minor modifications to mountings, the telephone shall comply with Specification S 1009 and shall be electrically interchangeable with Telephone 746 (Diagram N 846).

4.3.2 The usage of terminals T1-T19 shall remain unchanged. Terminals T11-T14 shall remain spare.

4.3.3 The telephone shall accept at least the following accessories (Diagrams N 848, N 849 refer).

1 Buzzer 32C-3	1 Part 2/DST/836
2 Switches 5A-4 (or equivalent)	1 Capacitor 7712 and Clip 90
1 Switch 19D-1	1 Button DBU/362
1 Thermistor 1A-1	2 Buttons DBU/363

Case DC0/723 with Buttons DBU/372 in lieu of Case DC0/703.

4.3.4 The colours of separate mouldings of the telephone shall match each other, where appropriate, to the satisfaction of the Director of Purchasing and Supply (P&S4.3).

4.4 Push-Button Unit. The push-button unit shall meet the requirements of Specification S 1204.

4.5 Spark Quench and Impulsing Contacts. The spark quench and pulse shaping circuit of Telephone 746 may be used. This consists of a 1.8 microfarad bell capacitor in series with parts of the circuit of total d.c. resistance approximately 15 ohm. In any event, the spark quench circuit shall consist of 1.8 microfarad in series with a non-inductive resistance of not more than 100 ohm.

4.6 Power Supply. The rechargeable battery shall be Battery Secondary 22 or 23 to Specifications BC 71 and BC 72 respectively. (Note. These are 4 and 6 cell nickel-cadmium batteries respectively each having a minimum capacity of 120 mA hour). The telephone will be purchased without a battery. It is the intention of the PO to purchase batteries separately and to fit them into telephones in the field on installation. The telephone shall be equipped with a polarized 2 pin plug (see fig 1b) for subsequent connexion of the appropriate battery. The telephone shall also be equipped with a suitable battery clamping device. A label shall be fixed to the telephone battery lead stating the code of the battery to be used ie either 22 or 23.

4.6.1 The battery charging circuit shall allow the following conditions to be met.

(a) When the battery is recharged by the line current from the exchange it shall only charge in the on-hook condition.

(b) When the battery is recharged by a local 10V d.c. supply (Power Unit 53A) it shall charge in both the on-hook and off-hook conditions.

4.6.2 The telephone shall normally be supplied connected for line charging with a charge-switching unit (CSU). The physical design shall be such that conversion from one method of charging to another can be easily effected by shifting straps or spade tag leads within the telephone as shown in Figure 1a.

4.6.3 Line Charging. The maximum current which may be taken from the line is 3 mA. The charging circuit shall be supplied connected for line charging on exclusive lines between terminals T9-T19.

4.6.4 Charge-Switching Unit. This unit, which shall be an integral part of the sender, is required to permit line charging of the battery during normal idle line conditions on both exclusive and shared service lines, but to disconnect the battery from line when these conditions are disturbed. The battery remains disconnected from line for a period of about  $\frac{1}{2}$  minute after idle conditions have been restored to enable line testing to take place. Conditions which must cause disconnection of the battery include,

- (a) lifting the handset of the associated telephone,
- (b) looping the line with a resistance of up to and including 350 ohm such as occurs when the handset of a parallel telephone is lifted,
- (c) disconnection of the line between the telephone and the transmission bridge,
- (d) application of interrupted ringing (40-90V  $16\frac{2}{3}$  or 25 Hz) to the line, with or without ringing return battery.

4.6.4.1 When normal line conditions are disturbed by any of these means the resistance of the charging circuit shall be increased to at least 2.5 megohm measured with a source emf 80V d.c. and internal resistance 30 kilohm applied for not less than 5.0 secs.

4.6.4.2 When normal line conditions have been restored for a period 20-100 seconds the battery and charging circuit shall be reconnected to line.

4.6.5 When starting with the battery fully discharged, followed by 16 hours continuous line charging, the telephone shall be capable of dialling at least 80 calls of 10 digits and with an average of 6 pulses/digit during a period of 8 hours continuous off-hook operating before failure to send pulses in accordance with par 4.7.3 occurs. This test is intended to simulate a worst case of telephone usage in a 24 hour period.

4.6.6 Starting with a battery fully discharged, followed by 16 hours continuous power unit charging, the telephone shall be capable of dialling at least 200 calls of 10 digits and with an average of 6 pulses/digit during a period of 8 hours continuous off-hook operating before failure to send pulses in accordance with par 4.7.3 occurs.

#### 4.7 Performance

4.7.1 The effective loop resistance of the telephone when not pulsing shall not exceed 300 ohm for direct currents in the range 25-125 mA.

4.7.2 The pulse loop resistance shall not exceed 50 ohm during make conditions and shall be not less than 0.5 megohm measured with 250V d.c. for not less than 5 seconds, during break conditions.

4.7.3 The duration of any complete pulse shall be not greater than 111 ms and not less than 91 ms (equivalent to 9 to 11 pps). The duration of any single break pulse shall be not less than 63% and not greater than 70% of the time of the whole pulse. The pulsing contacts shall operate with contact bounce not exceeding 5 ms.

4.7.4 The mask contacts simulating the dial off-normal contacts shall operate between 300 ms and 920 ms prior to the first break pulse of the first pulse to be transmitted.

4.7.5 The mask contacts shall remain operated for the whole period of the interdigit pause. The IDP, when measured between the last make of the last pulse of one digit and the first break of the first pulse of the next digit, shall be not less than 720 ms and not greater than 920 ms.

4.7.6 After the last break pulse of the last digit in the store, the mask contacts shall not restore until a period between 28 ms and 920 ms has elapsed.

4.7.7 The sender shall be capable of accepting digital signals from a push-button unit at a rate of up to 15 digits/sec.

4.7.8 The telephone shall be insensitive to line polarity, and to any changes in line polarity which may occur during the course of a call.

4.7.9 The introduction of the sender into the telephone circuit shall not worsen the transmission performance compared with that of the corresponding dial telephone in respect of send, receive and side-tone sensitivity/frequency and reference equivalent characteristics.

4.7.10 The insulation resistance between points designed to be electrically isolated shall be not less than 5 megohm measured with 250V d.c. applied for not less than 5.0 secs.

4.7.11 The sender shall be designed to withstand, without damage, the application of a pulse derived from a 4  $\mu$ F capacitor charged to 4 kV and applied to a series combination of 4 ohms and 40 ohms non-reactive resistors with the equipment under test connected across the 40 ohm resistor.

4.7.12 Radio Interference. The telephone shall comply with the requirements of BS 800:1954.

4.7.13 The level of any signals sent to line by the sender shall be below -80 dBm.

#### 4.8 Components

4.8.1 All components shall be of types approved by the Director of Telecommunications Development (TD2.3.2).

4.8.2 Components which may be adversely affected by line voltage surges, ringing current etc must be adequately rated or protected.

4.8.3 No open-type spring-sets shall be used in the sender.

### 5. MARKING

The telephone shall be marked with the stroke number, the PO stock list number, the approved code letters identifying the manufacturer and the year of manufacture followed by the mark number eg

-/764 FHB 99/1

The stroke number will be allocated to manufacturers when their design has been approved (see Appendix).

6. REFERENCES

Specifications

BC 71  
BC 72  
D 1000  
D 4000  
S 1009  
S 1204  
BS 800

Diagrams

N 846  
N 848  
N 849

END OF SPECIFICATION

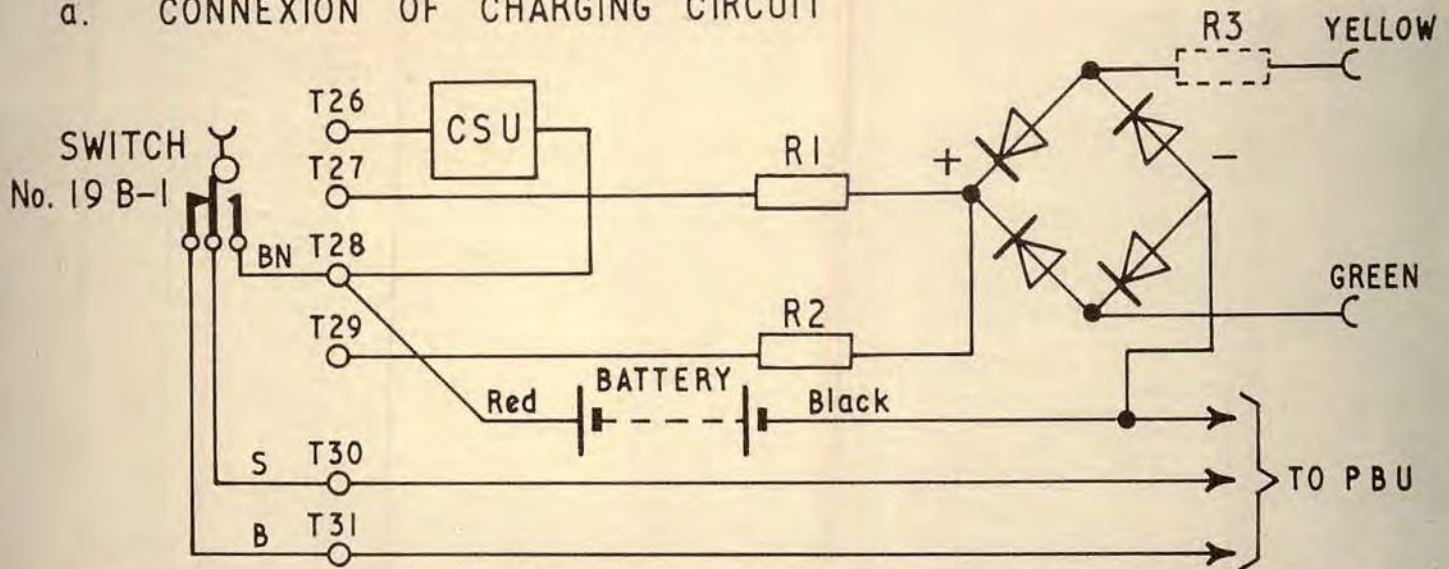
TD2.3.2/PAB/4674

PO Telecommunications Headquarters  
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100/110 High Holborn  
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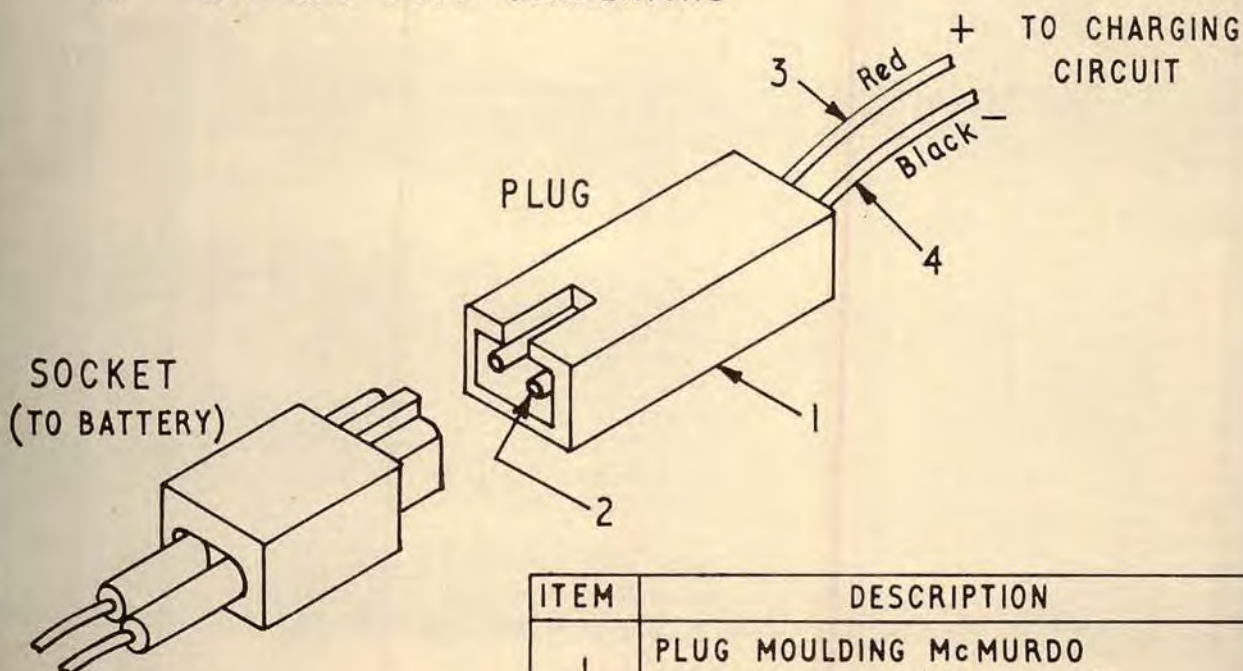
## a. CONNEXION OF CHARGING CIRCUIT



CHARGING METHOD	STRAP	CONNECT	
		YELLOW	GREEN
From line current	T26 - T27	T9	T19
From 10V power unit	T27 - T28	PU + ve	PU - ve
From 50V power unit	T28 - T29	PU + ve	PU - ve

NOTE:- The Yellow & Green wires will be terminated with spade tags.  
The wires connected to T26-T31 will be terminated with ring tags.

## b. BATTERY PLUG CONNEXIONS



ITEM	DESCRIPTION	No. OFF
1	PLUG MOULDING McMURDO PART MP 3522 (OR EQUIV)	1
2	PLUG CONTACT ASSEMBLY McMURDO PART MP 5133B (OR EQUIV)	2
3	WIRE EQMT No. 4207	AS
4	WIRE EQMT No. 4208	REQUIRED

NOTE:- The socket will be supplied with the battery