
SCEPTRE 100



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These guide notes have been designed to assist Field Staff with the installation and maintenance of Sceptre. To gain maximum benefit from them they should be read completely, by both Installation and Maintenance staff.

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Difficulties

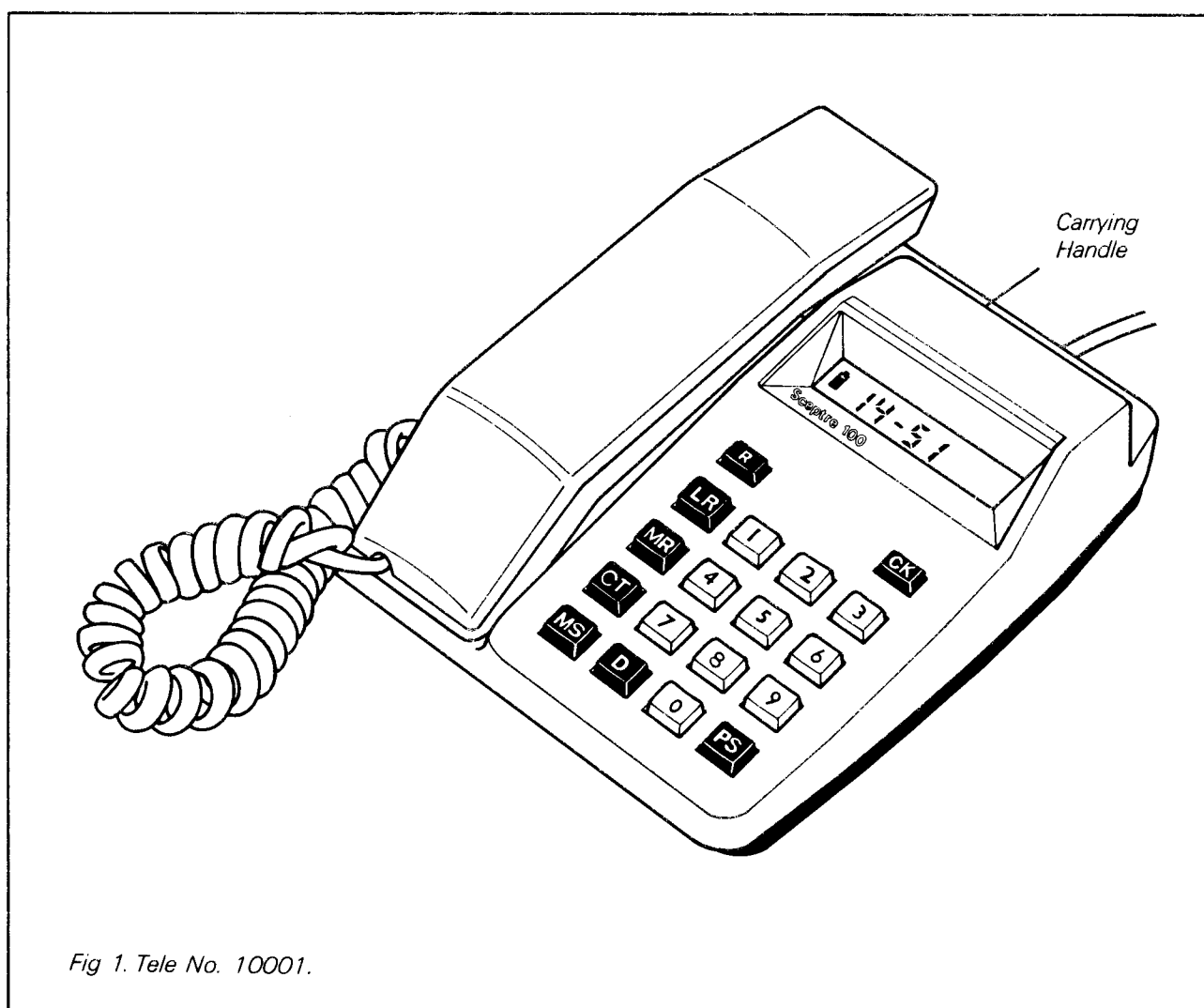
BTHQ relies to a large extent on the A646 procedure to show up problems which staff experience with items of equipment. Please take advantage of this procedure to inform BTHQ of difficulties, so that corrective action can be taken.

TI E1 A0001 describes the A646 procedure fully.

SCEPTRE 100 TELEPHONE NO 10001

1. General Description

Sceptre 100 is a new design of electronic telephone featuring an eight digit liquid crystal display (LCD) panel. The telephone is available as self-contained (SC) loop disconnect signalling versions only. Two colours are available, these are, two-tone blue and two-tone beige. The telephone is intended to be "free standing" and is not suitable for wall mounting. Fig 1 shows a typical Sceptre telephone.



A carrying handle is formed by a recess in the case at the rear of the digit display panel, a number label is positioned on the left hand side of the telephone covered by the handset when "on-hook". "Ambassador" number labels are used in this holder.

Adjacent to the keypad are seven facility buttons and a "recall" button. The facility buttons are used to control operations of the microprocessor controlled LCD panel. The "recall" button is used for operator recall when the telephone is used as an extension from a PBX.

The telephone contains a high impedance tone caller but a volume control for this is not provided.

A battery box is provided in the base of the telephone, see fig 2. This houses four dry batteries used to power the LCD microprocessor whilst the telephone is "on-hook"; when the telephone is "off-hook" power is drawn from the line. The preferred batteries are 1.5v Alkaline Super Power MN 1500 LR6 type, these are recommended as being of long life and less liable to leakage than other batteries of the same size and voltage.

The batteries are the responsibility of the customer.

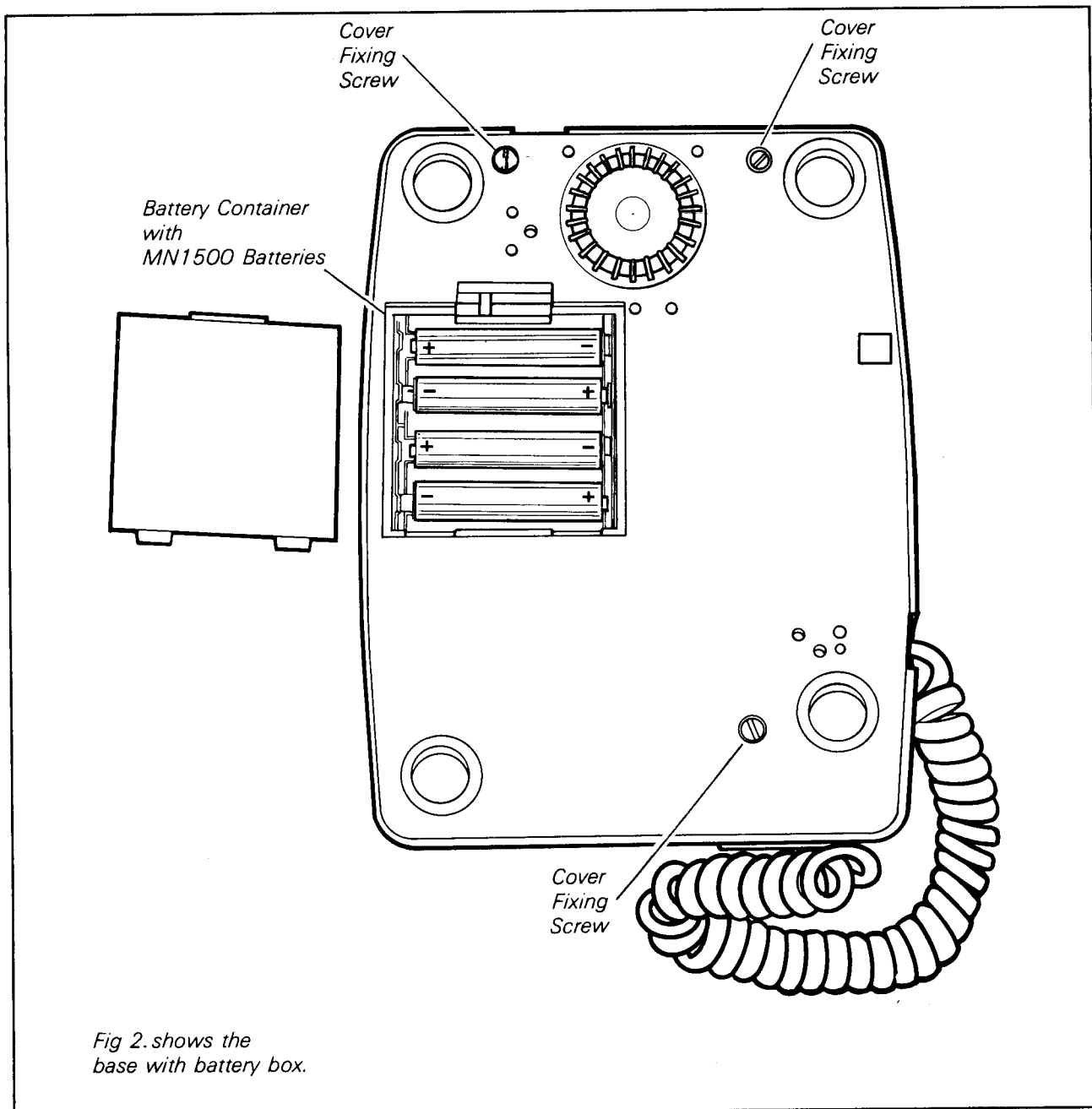


Fig 2. shows the base with battery box.

2. Use

Sceptre may be used:–

- i as a DEL (exclusive service only)
- ii as an extension on “New Plan” type installations
- iii as an extension from a PBX or PABX using loop/disconnect signalling and earth/loop recall

Sceptre is not suitable for:–

- i MF or DC Code C signalling systems
- ii PBXs using “C wire” recall
- iii on installations together with Special Range Telephones (SRT) other than “high impedance” 8000 type telephones.

3. Installation

The installation of Sceptre follows normal “plug and socket” type practice using Insulation Displacement Terminations. Both the handset cord and the line cord are plug ended.

Where Sceptre is installed together with telephones using low impedance calling devices these should be changed or adapted to high impedance working.

On completion of the installation the batteries should be fitted to the telephone and the clock started and set to the correct time. The procedure for setting the clock is described in para 4 (Page 5). All facilities should be checked and the operation of all keypad buttons should be tested for the repertory dialling facility.

4 . Facilities

General. Sceptre has the normal facilities associated with a standard telephone except that there is no adjustable volume control for the tone caller. Several additional facilities are provided, these are all associated with the LCD and are microprocessor controlled. The microprocessor is powered by four MN 1500 LR6 alkaline batteries while the telephone is "on-hook" but line powered when "off-hook". The batteries are the responsibility of the customer and should have a life of one year.

The additional facilities are:–

- i Clock display in 24 hour time while the handset is "on-hook".
- ii Display of digits keyed when making outgoing calls.
- iii Repeat of last number keyed, with a display of that number.
- iv Display of last number keyed.
- v 10 address repertory dialling, with display of number called.
- vi Access pause for repertory dialling via a PABX.
- vii Display check of numbers stored for repertory dialling.
- viii Timing of a call in progress with a minutes and seconds display.
- ix Display of the duration of the last call timed, in minutes and seconds.
- x Recall.

Clock Display. With the handset "on-hook" the LCD displays the time of day in 24 hour time. The time is shown as hours and minutes on the left hand side of the display panel. Fig 3 shows the display 14-51, that is 2.51 pm.

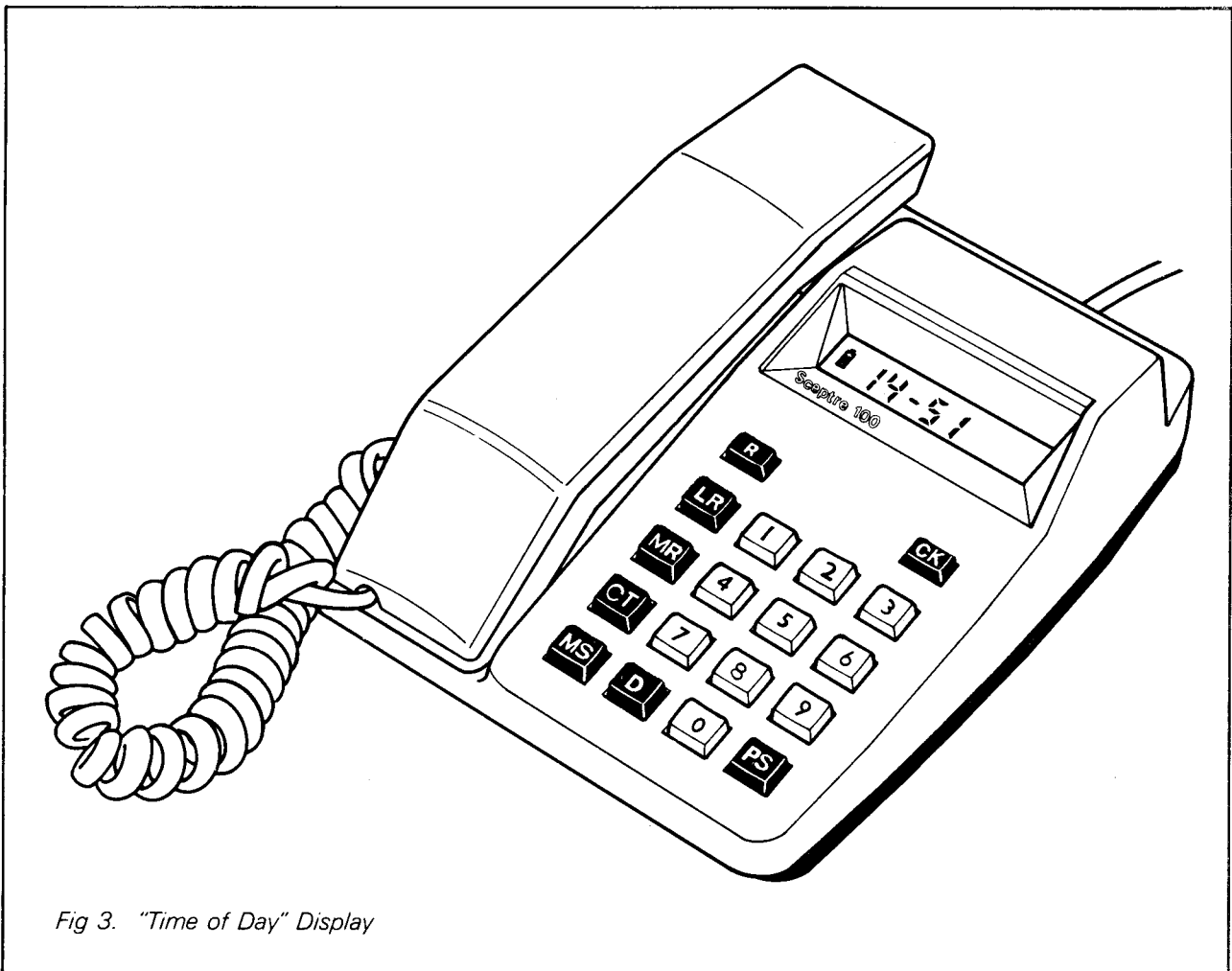


Fig 3. "Time of Day" Display

To set or reset the clock:—

- i Leave the handset "on-hook".
- ii Press and **hold down** button **CK** , note the display is cleared leaving a single dash (—).
- iii Key in the time, in hours and minutes, using the digits of the keypad.
- iv Release button **CK** , timing will commence when **CK** is **released**.

The clock has an accuracy of 15 parts per million equal to 1¼ seconds per day or 1 minute in seven weeks.

Display of digits keyed. When the handset is lifted to make a call the time display is cleared. When, on receipt of dial tone the required number is keyed, the number is displayed digit by digit, like a calculator, from the right. This display stays until either the handset is replaced or the call is timed. Fig 4 shows a typical display. Note: if the number contains more than 8 digits the first digits are "lost" on the L.H.S. of the display.

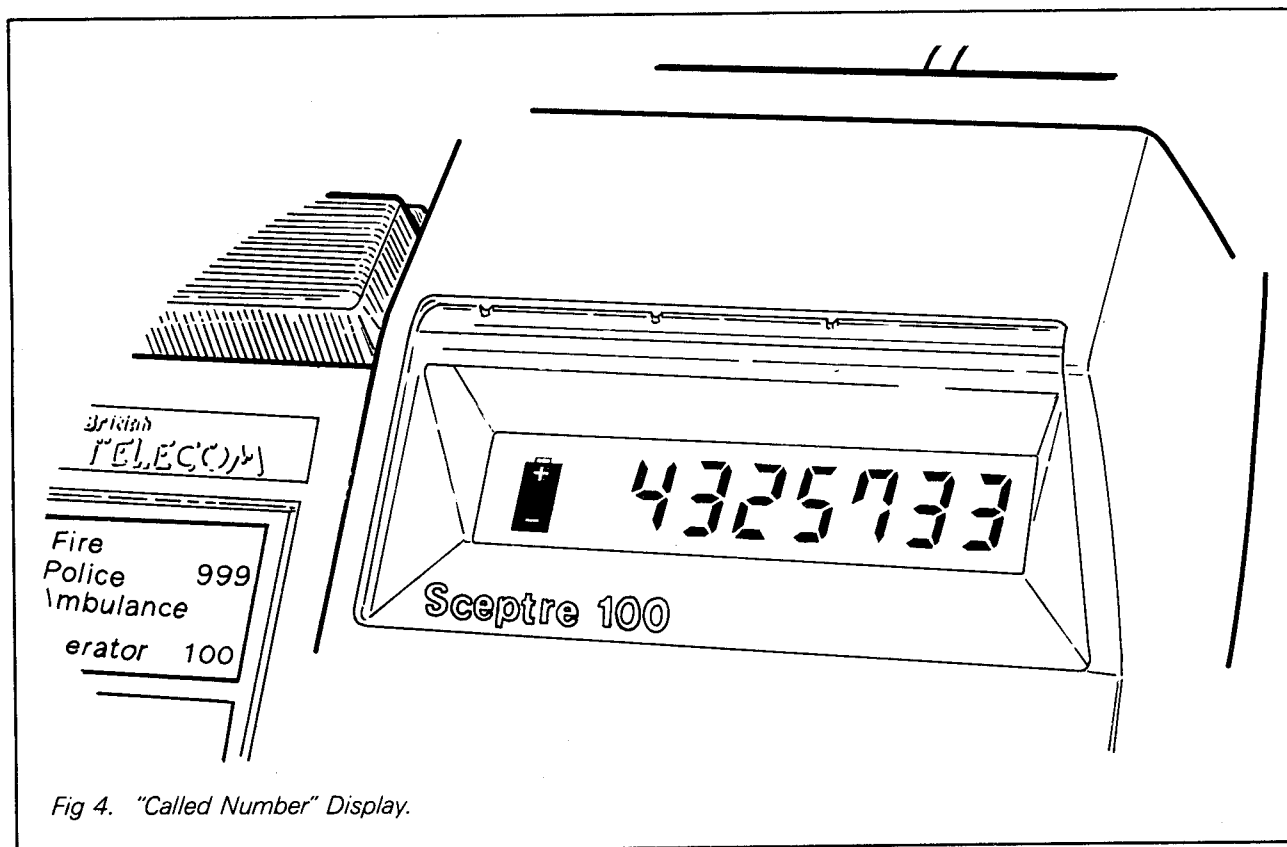


Fig 4. "Called Number" Display.

Display of the last number keyed. If, after replacing the handset it is required to check the last number that was keyed:—

- i Leave the handset "on-hook".
- ii Press and **hold down** button **D**
- iii If the number has eight digits or less, press and release button **LR** . The number last keyed will be displayed.
- iv If the number is of more than eight digits, press and **hold down** button **LR** . The first digits of the number will be displayed.
- v Release button **LR** . The last eight digits of the number will be displayed.
- vi Release button **D** . The number display will be cleared and the clock display will return.

Repeat last number keyed. If the last number keyed is to be called again, say no reply, or engaged tone was received:–

- i Lift the handset, listen for dial tone.
- ii Press and release button **LR** . The last number keyed will be repeated. As the digits are pulsed to line the display builds from the right to display the number called. This can be repeated any number of times until another number is manually keyed.

Only the **last** number **manually keyed** is repeated. **Note** if the number dialled is more than 16 digits in length it will **not** be remembered in the LNR store.

10 address repertory dialling. Up to ten exchange line numbers each of up to 16 digits may be stored under digits 1 to 0 of the keypad.

To store a number:–

- i Leave the handset “on-hook”.
- ii Press and **hold down** button **MS** .
- iii Press and release the digit button (1 – 0) under which the number is to be stored.
- iv Using the keypad, “key in” the digits of the number to be stored.
- v Release button **MS**

To change a stored number:–

By repeating the sequence to store a number (above) the existing number will be deleted and replaced by the new number.

To call a stored number:–

- i Lift the handset, listen for dial tone. Note the clock display is cleared.
- ii Press and release button **MR** .
- iii Press and release the keypad button under which the required number is stored.

The number will be called automatically, each digit is displayed as it is transmitted.

To remove a number from store without storing another:–

- i Leave the handset “on-hook”.
- ii Press and **hold down** button **MS** .
- iii Press and release the digit button (1 – 0) from which the stored number is to be removed.
- iv Release button **MS** .

Access Pause. If Sceptre is used as an extension from a PABX and access to an exchange line for the purpose of making an outgoing call is by dialling or keying an access digit (typically 9 or 7) followed by a pause to wait for exchange dial tone, this pause can be inserted into the repertory dialling sequence.

To insert the pause in the sequence, the procedure "to store a number" should be followed:—

- i Leave the handset "on-hook".
- ii Press and **hold down** button MS
- iii Press and release the digit button (1 – 0) under which the number is to be stored.
- iv Using the keypad, "key in" the exchange access digit.
- v Press and release button PS .
- vi "Key-in" the remaining digits of the required number.
- vii Release button MS

The access digit, a pause for exchange dial tone and the exchange number required are now stored. Fig 5 shows a number with pause display.

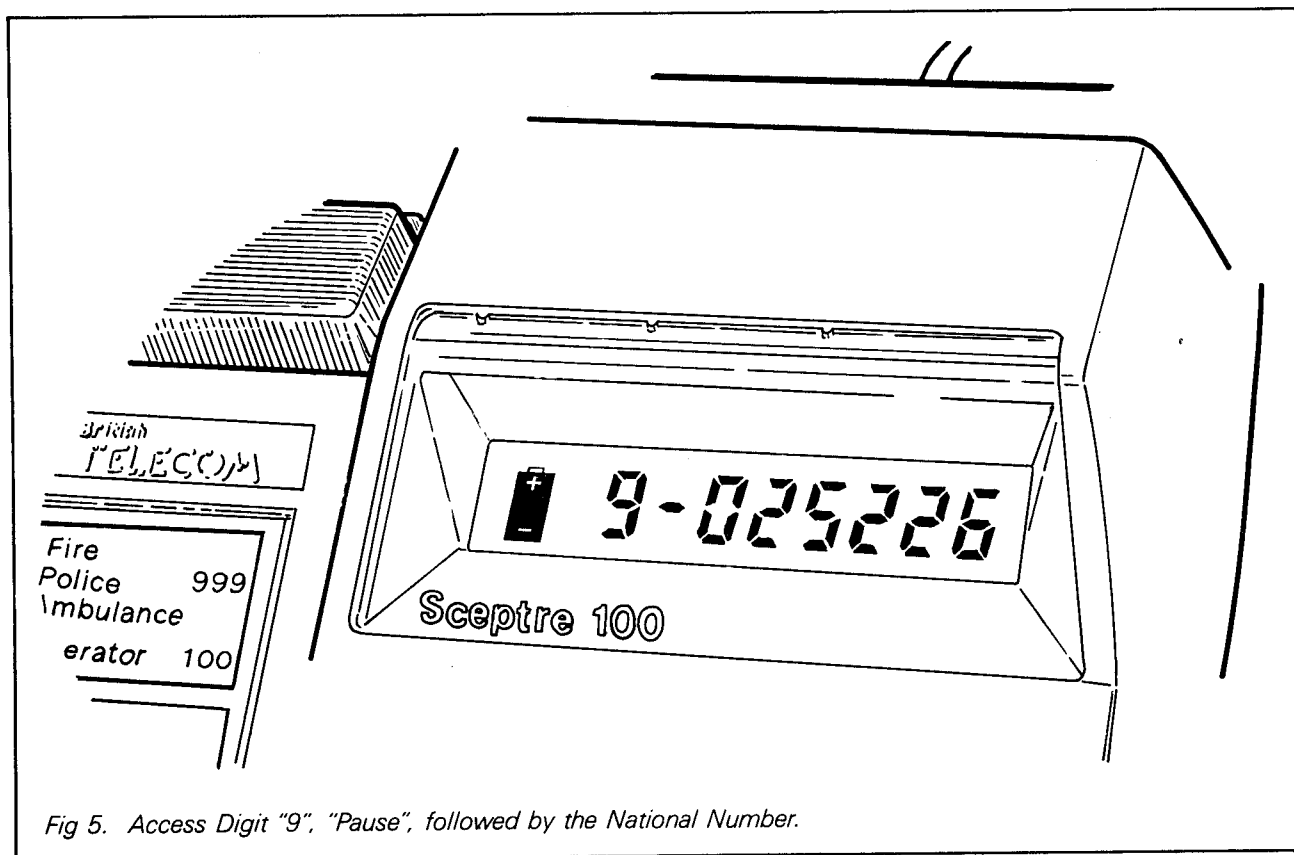


Fig 5. Access Digit "9", "Pause", followed by the National Number.

To make a call to a stored number, using an access pause:–

- i Lift the handset, listen for P.B.X. dial tone
- ii Press and release button **MR**
- iii Press and release the keypad button under which the required number is stored – the access digit only will be transmitted.
- iv Wait and listen for Exchange dial tone
- v On receipt of exchange dial tone press and release button **LR** . – the remainder of the required number will now be transmitted.

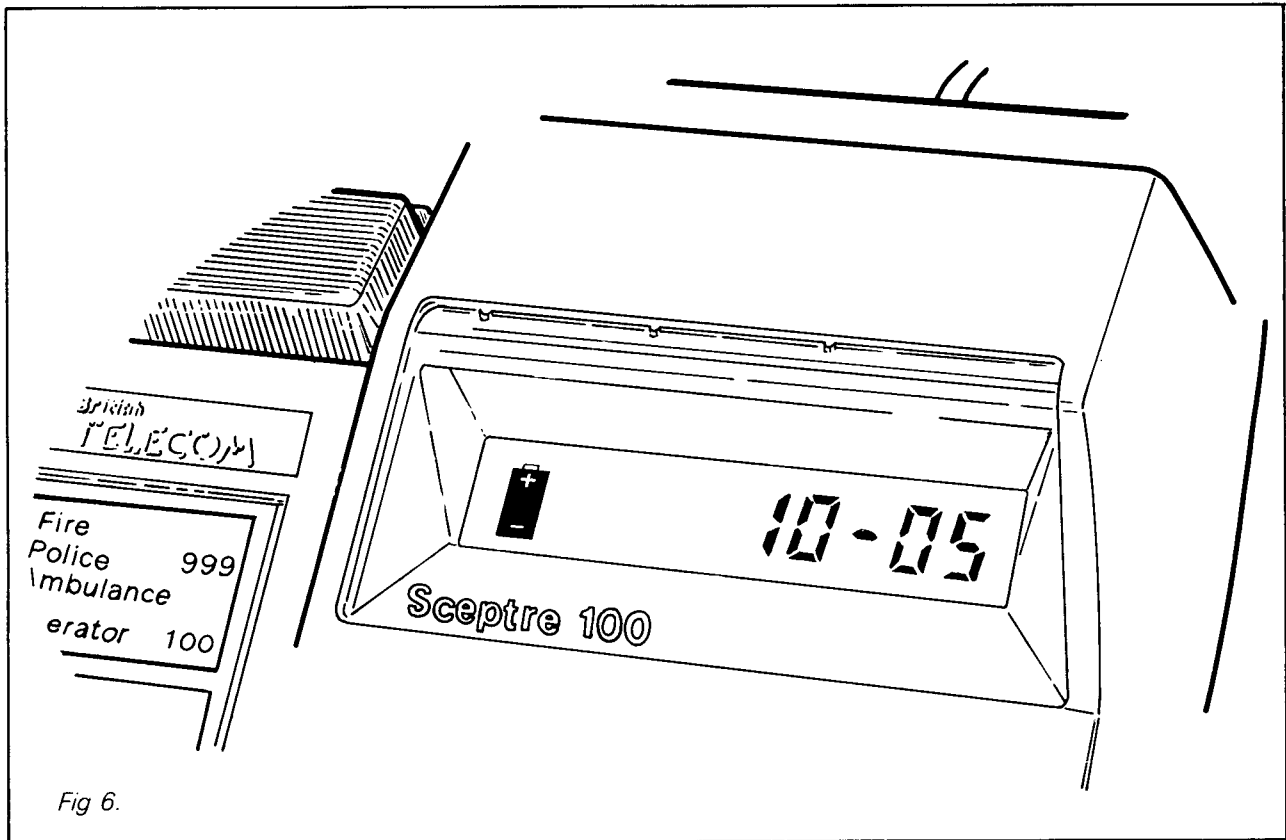
Display check of stored numbers. To check the number stored under a digit button:–

- i Leave the handset “on-hook”.
- ii Press and **hold down** button **D** . Note the clock display is cleared.
- iii Press and release the digit button to be checked. If the number is of eight digits or less it will be displayed. If the number is of more than eight digits the first digits will be displayed while the digit button is pressed, the last eight digits will be displayed when the digit button is released.
- iv Release button **D** , the number display will be cleared to be replaced by the clock time display.

Timing a call in progress. Sceptre may be used to time the duration of a call if required. It must be stressed that this gives an indication of the duration of the call but **not** the **cost**.

To time a call, when the called party answers:—

Press and release button **CT**, the “number keyed” display will be cleared and a display of minutes and seconds will be given on the right hand side of the panel. Fig 6 shows a time of ten minutes and five seconds.



At the end of the call, when the handset is replaced, the call timer will be stopped, and the time of day display will be returned.

Display of duration of last call timed. After completion of a call replacing the handset reverts the display to the “time of day”. To check the duration of the last call timed:—

- i Leave the handset “on-hook”.
- ii Press and release button **CT** **twice**. The display will show the total elapse time in minutes and seconds of the last call timed.
- iii Press and release button **CT** once again, the elapsed time will disappear and be replaced by the “time of day”.

Note: Call timing will only start when button **CT** is operated with a call in progress. The time elapsed of a timed call is stored and can be displayed at any time until another call is timed.

Recall. A recall button **[R]** is provided for use when Sceptre is fitted as a PBX extension. It should be used according to the operating instructions relating to that type of PBX.

5. Battery Test

A battery indicator is provided as a symbol on the left hand panel of the LCD, see Fig 7. To check the state of the batteries, check that the telephone is plugged into the exchange line:—

- i lift the handset
- ii check that the battery symbol is showing
- iii replace the handset, the symbol should still be visible, if it is not, the batteries should be changed.

To change the batteries, make sure that the telephone is plugged into the exchange line, and lift the handset. This will maintain the clock and stored number programmes. Open the battery compartment in the base of the telephone (fig 2) and remove the old batteries. Insert new batteries, type MN 1500 making sure they are the correct way round as shown on the moulding in the battery compartment. Replace the battery compartment cover and check the operation of the instrument.

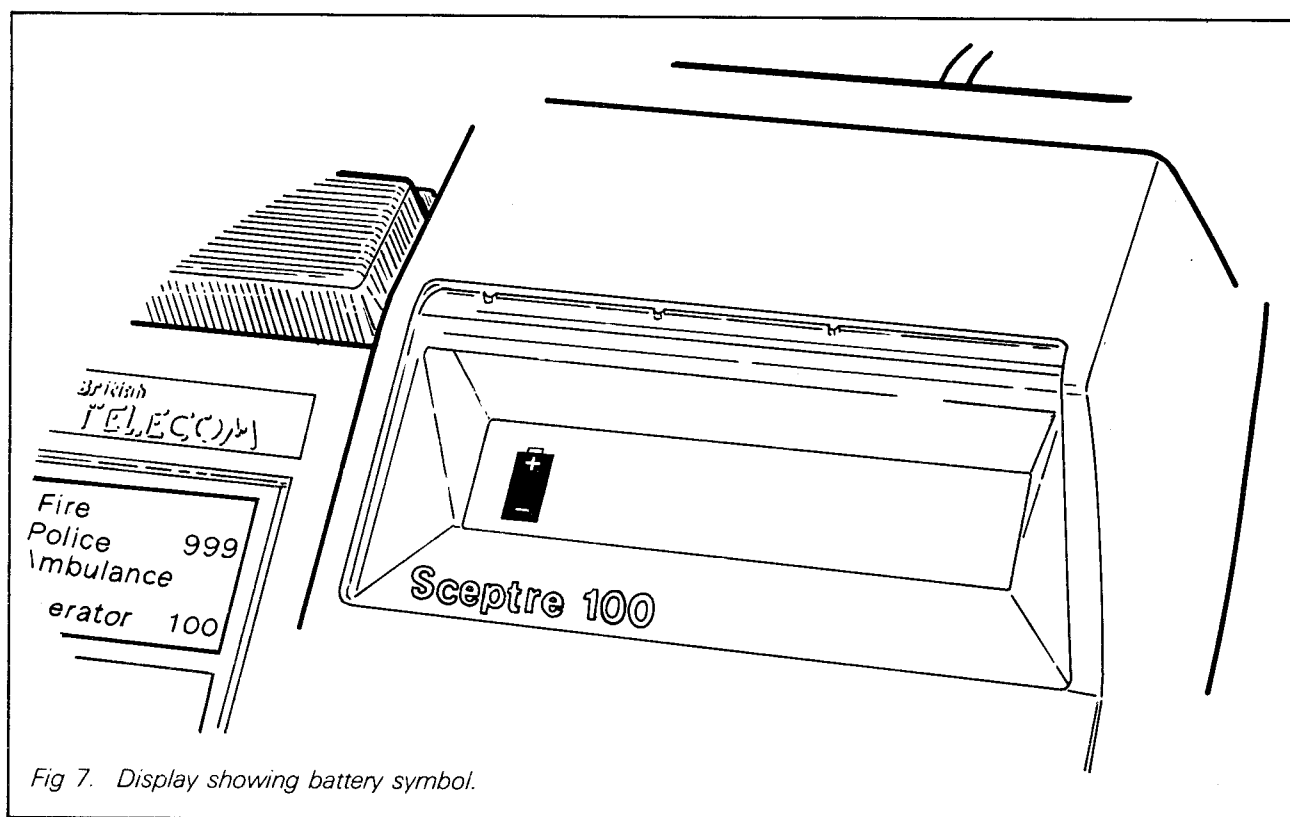


Fig 7. Display showing battery symbol.

6. Maintenance

Maintenance of Sceptre 100 is normally restricted to changing the line or handset cords both of which are plug ended. Faults proved to be in the telephone will require either the handset or the complete telephone to be changed.

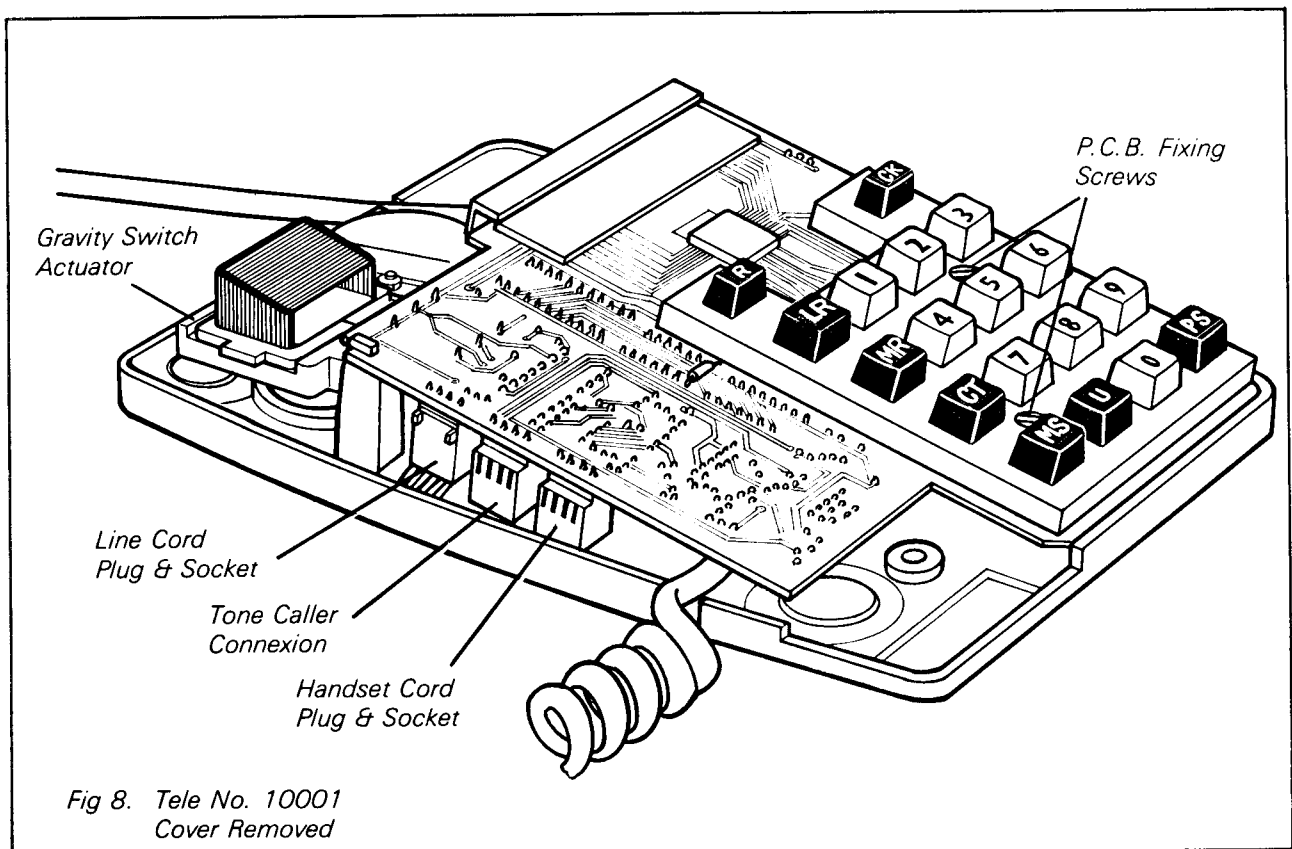
Maintenance of the batteries is the responsibility of the customer.

Although the transmitter and receiver insets are standard "rocking armature" types it is not recommended that these are changed in the field. This is because these items are "matched" to the telephone circuit, changing either the transmitter or the receiver inset singly or in other than "selected" pairs may degrade the performance of the telephone.

To Change the Cords

The sockets for both the line cord and the handset cord can only be accessed with the telephone cover removed:—

- i Remove the three fixing screws in the base of the telephone, see fig 2.
- ii Lift the cover clear. Note the position of the gravity switch actuator restoring spring!
- iii Remove the two cross-head screws visible on the keypad. See fig 8.



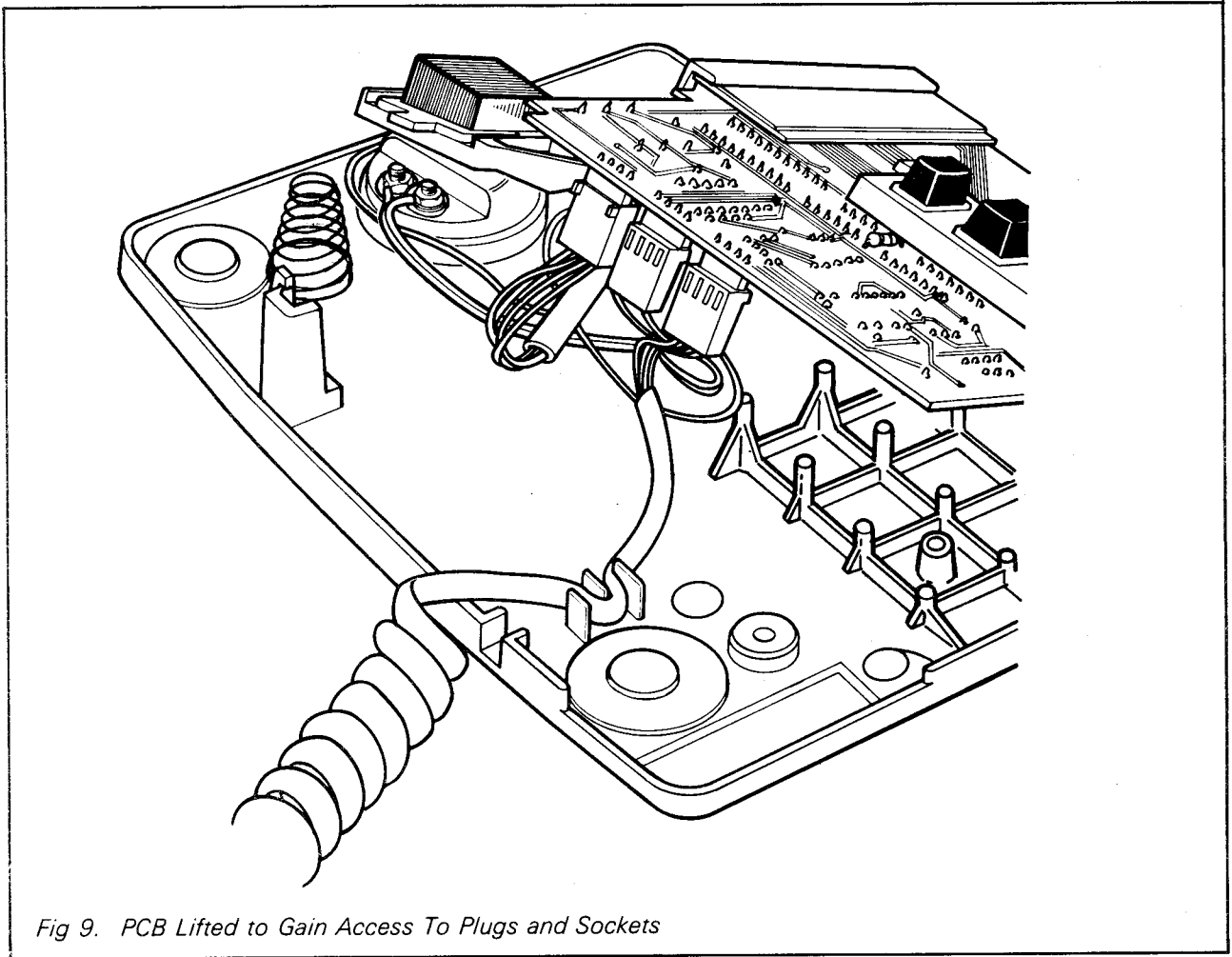


Fig 9. PCB Lifted to Gain Access To Plugs and Sockets

- iv Lift the p.c.b. and keypad assembly clear. See Fig 9.
- v Support the p.c.b. while removing and replacing the appropriate plug.
- vi Replace the p.c.b. Ensure that the gravity switch actuator and return spring are correctly positioned. The spring should be located in the base circle and the square in the actuator.
- vii Replace the telephone cover, tighten all fixing screws.
- viii Check the operation of the clock and check stored numbers.

Avoid touching the PCB, handle only by the edges. If the tele display is not operational, remove and re-insert 1 battery cell. Removing and re-inserting one cell with the telephone disconnected from the line will reset the microprocessor. This will be necessary if the display fails to respond to keyboard input after re-assembly, indicating that the circuitry associated with the microprocessor oscillator has been touched momentarily stopping it from working. Remember, the customer may have opened the case to look inside and touched the circuit board, and the fault may be presented as a non-working telephone.

When the telephone is reset in this way it will be necessary to reset the clock and re-enter stored numbers.

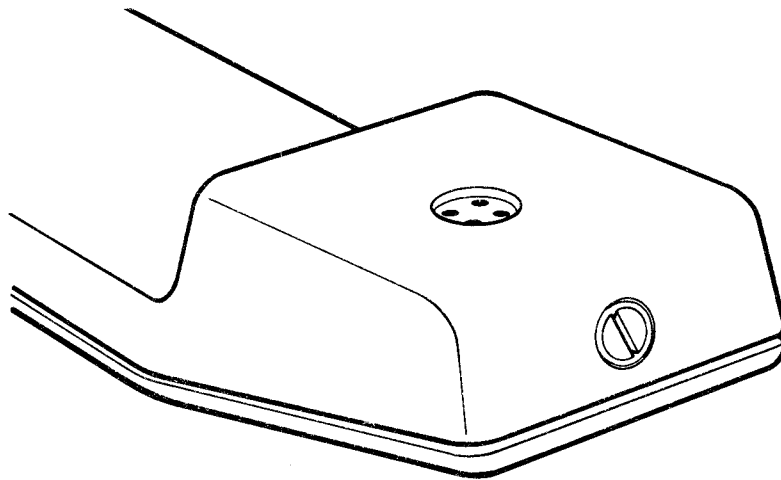


Fig 10. Handset Fixing Screw

To change the handset cord at the handset:—

- i Undo the fixing screw at the receiver end of the handset see fig 10
- ii Separate the two halves of the handset
- iii Unplug the cord
- iv Replace the handset cord, reassemble the handset and tighten the fixing screw.

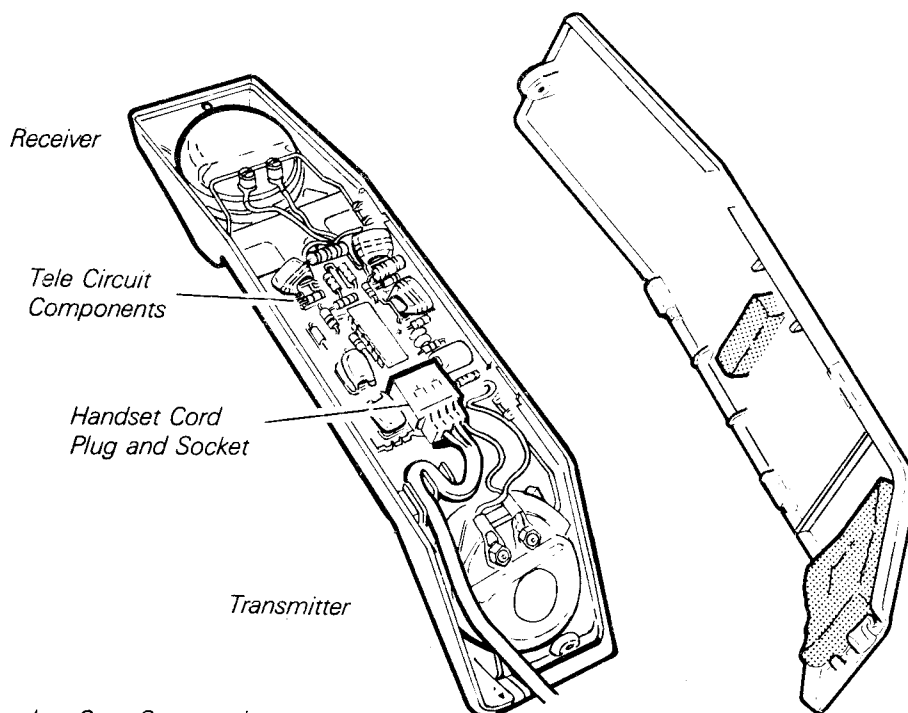


Fig 11. Handset Case Separated

7. Circuit Description

The main P.C.B. within the telephone case carries:–

- i The logic components
- ii The display components
- iii The keypad signalling circuit
- iv The tone caller circuit
- v The gravity switch and all press buttons
- vi Protection components

The telephone transmission circuit is contained on a separate p.c.b. within the handset. The circuit contains an Integrated Circuit (IC) and the various discrete components. The output from the microphone is amplified and sent to line and the incoming signal is fed to the receiver, using a “bridge” circuit. Send and receive gains are varied depending on line current to compensate for different lengths of the local line.

The advantages of this circuit are:–

- i Better control of telephone impedance
- ii Reduced sidetone
- iii The ability to use linear microphones without extra amplification
- iv Small size of circuit components

Logic and Display

The heart of Sceptre 100 is the SAA 6002 microprocessor which is responsible for:–

- i Receiving information from the keypad
- ii Controlling pulsing to line
- iii Storing numbers in the memory unit
- iv Displaying all information on the L.C.D.

Associated with the microprocessor are three ICs:–

- i A memory chip – used to store repertory numbers
- ii A general purpose logic chip
- iii A scanner chip which monitors all press buttons row by row

The microprocessor is contained in a 64 lead flat pack, 34 of the connexions are required for the LCD, the remainder are used for controlling data input and output and dialling.

The L.C.D. is driven directly from the microprocessor and displays numerals "0" to "9", the symbol (\Rightarrow) which indicates an access pause and a "battery condition" indicator. This is on the left hand side of the panel. This symbol is always fainter than the other displays but should always be visible. If the symbol fades when the handset is on-hook this indicates that the dry batteries require changing.

The Keypad

The keypad consists of 17 individual buttons operating on a specially made flexible rubber elastomer with conductive rubber inserts. When a button is depressed the conductive rubber insert under the button bridges contacts on the printed wiring board. The "recall" button operates through the elastomer but operates a conventional microswitch.

Timing

Timing is generated from a 32768Hz watch crystal, with an accuracy of 15 parts per million, this is approximately equal to 1¼ secs per day. The total power consumption of the clock circuit is less than 300 μ W (100 μ A at 3v) giving a life of about 2 years from the four MN1500 type batteries.

The Tone Caller

A separate IC is used to generate alternatively two harmonically related square wave currents of 512Hz and 640Hz. These are combined with a shift rate of 16Hz to operate the tone caller to give a distinctive note. The IC derives its power from rectified, smoothed ringing and drives the tone caller transducer directly. The circuit is capable of operating up to 3 additional tone callers or high impedance bells in a parallel circuit.