Post Office Telecommunications

Customers Apparatus Maintenance Guide Notes

Automatic Callmakers

CUSTOMERS APPARATUS MAINTENANCE GUIDE NOTES

These guide notes are the first of what is hoped will be a series for the Customers Apparatus Maintenance Technician. The notes have been designed to help the Maintenance Technician when he meets unfamiliar items of customers apparatus which in many cases have been developed since he was formally trained.

A646 Procedure. THQ relies to a large extent on the A646 procedure to show up problems which maintenance staff are experiencing. Without the information which is supplied by A646s, it is very difficult for any corrective action to be taken. Please do take advantage of the A646 procedure to inform THQ about difficulties which are occurring. TI E1 A0091 describes the procedure fully.

In producing these notes we would like to thank THQ Service Department for their close co-operation and checks for technical accuracy.

Vocational
Training Division
THQ/TP 7.1.2

AUTOMATIC CALLMAKERS

Autodiallers have been introduced so that customers can call numbers they
contact regularly without having to dial or remember their number. At present
there are three types of Autodial available to customers each giving standard
loop-disconnect pulsing to the automatic telephone exchange.

SECTION 1
Autodial 101A (Key Callmaker)

Can automatically dial any one of 32 separate telephone numbers by the
press of a button.

SECTION 2
Autodial 201A (Tape Callmaker)

This small unit can remember and automatically dial any one of 400 telephone
numbers.

SECTION 3
Autodial 301/302A (Card Callmaker)

Each recorded number is stored on a punched card. There is no limit to the
number of cards available to customers.

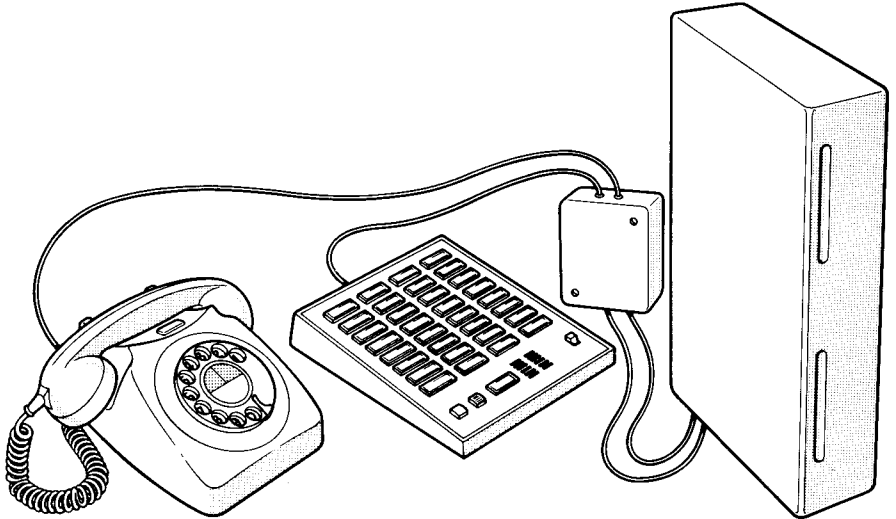## SECTION 4
References

AUTODIAL 101A (KEY CALLMAKER)

Fig.1.

BASIC FACILITIES

a. Can select and store up to 32 separate numbers each up to 16 digits long. This could include an access digit/s ie 010 for international or 9 preceding all other digits for PABX if required.

b. Automatic seizure of exchange line by a loop when call button pressed, with a red lamp to show line is being held.

c. Pulsing out of digits in standard 10 pps form Break/Make ratio 2:1 with 800 mS intertrain pause (2000 mS after access code)

d. Amplified loudspeaker in desk unit so that customer can monitor call progress.

e. Automatic release of callmaker when receiver lifted, or cancel button pressed, or approx. 60 secs after dialling.

f. Power on - off switch with green lamp to indicate when callmaker is "on".

TO MAKE A CALL

a. Switch on black switch (bottom right of keypad) the green lamp should glow.

b. Press key appropriate to address to be called.

c. The autodial will now pulse out the number, ringtone should be heard over the loudspeaker.

d. When the called sub answers lift the handset for conversation.

NOTE

If the handset is not lifted within approx 60 secs from the end of dialling then the Autodial will automatically release.

> *The present Key Callmaker is eventually to be replaced by a similar new device which is at present under development.*
> *It is expected that new key callmaker will have an integral translator and will use the latest electronic techniques.*
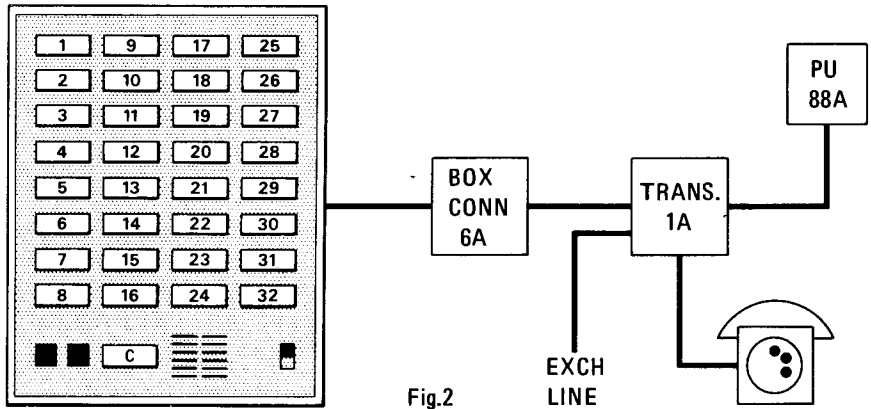
SIMPLIFIED CIRCUIT OPERATION

Fig.2

On pressing an address button a positive voltage condition is extended from the key unit to the translator via the Box Conn 6A. Key 1 extends the condition to Tag 1 in the translator Key 2 to Tag 2 etc. This condition operates relays RLA and RLC to seize the Exchange with a loop.
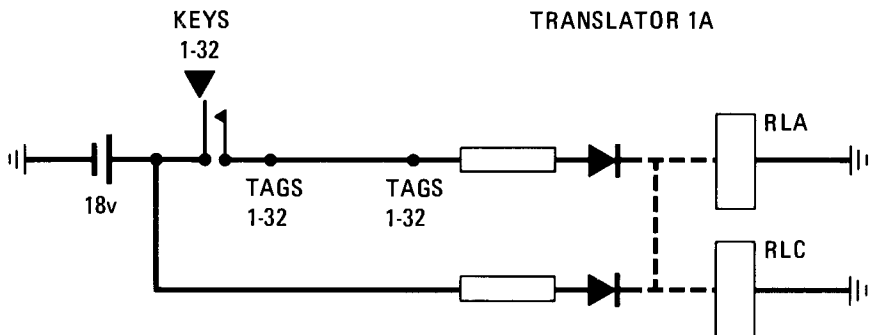
KEY UNIT

Fig.3

After approx 2000 millisecs relay RLB starts to pulse giving loop disconnections to line, an intertrain pause of 800 miliseconds is inserted between each train of pulses.

When the complete number has been pulsed relay RLA releases leaving exchange held via RLC1 and the hold resistor, the call progress can be heard over the loudspeaker. On lifting the telephone handset the loop is recognized by the detection circuit and RLC relay is released leaving the telephone loop to hold the exchange line. RLC relay is also released by operation of the cancel key (+ve voltage on lead 40) or by the 60 sec time out circuit. Both of these methods will disconnect the loop and release the exchange equipment, if the handset is not lifted.
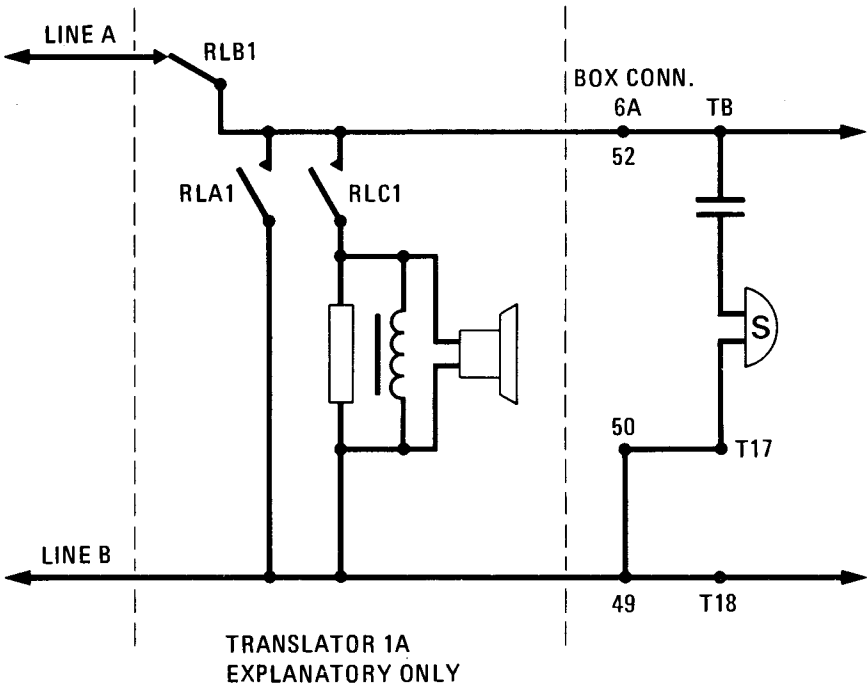

TRANSLATOR 1A
EXPLANATORY ONLY

Fig. 4

MAINTENANCE

The autodial is complex and local maintenance is limited to items shown below.

KEY UNIT

The lamps may be changed (Lamps 41B), buttons inspected, and wiring checked.

To inspect the key unit remove its four base screws, this gives access to the connection cord. For access to the lamps and keys the fascia panel is removed by undoing the two screws found in the centre of the Latch Mechanism support bracket (see fig. 5).

REMOVE THESE
SCREWS FOR
ACCESS TO
FACIA PANEL

CONNECTION
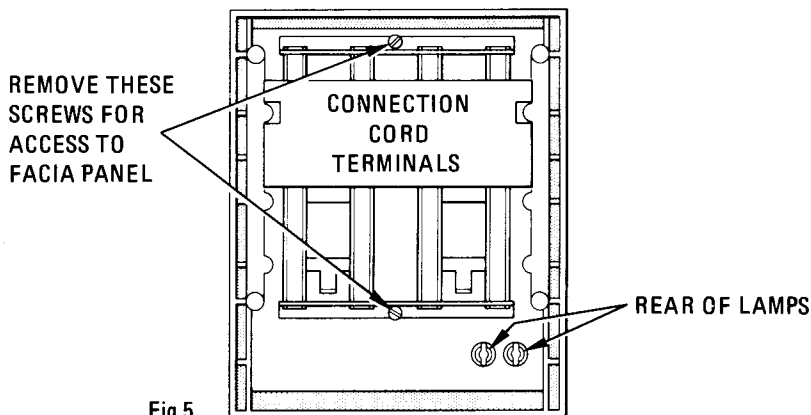CORD
TERMINALS

REAR OF LAMPS

Fig.5

When replacing the base do not forget the rubber sealing band. This is replaced by loosely fitting the base with its four screws then replacing the rubber sealing band before completely tightening the base screws.

The complete unit may be changed by unplugging from the Box Connection 6A.

TRANSLATOR 1A

Most of the Electronic components in the translator are enclosed and cannot therefore be maintained in the field. However jumper connexions should be checked (these can be altered by customers) if wrong number faults are reported.

Access can also be gained to the 41 wire and 4 wire cables by removing the four corner screws of the metal surround.

This surround also gives access to four variable resistors.

RV5 Adjusts length of time out cct.
(Approx 60 secs from end of dialling)

Slider
Adjusts
Volume
on
Loud
Speaker

RV1 Can be turned anticlockwise to lengthen the
(Long and Short) Interdigital pause.

RV2

Louder

RV3

RV7

RV2 and RV3 together affect Speed and
Ratio of Pulsing and must NOT be adjusted.
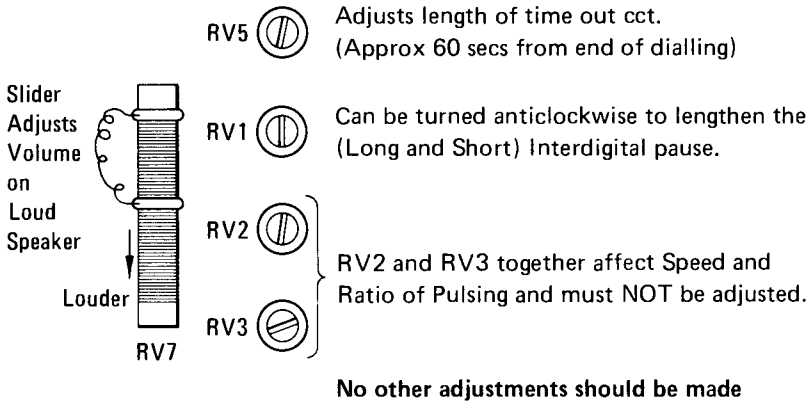
No other adjustments should be made

Fig.6

POWER UNIT 88A

Power unit maintenance is restricted to changing fuses.

If faults cannot be located and cleared in this limited way then the faulty unit
must be changed. Spare equipment if not held locally, is held at the P.O factory
(Enfield) as detailed in T1 E5 A0015.

Whilst waiting for parts ordinary exchange line facilities should be provided.

NOTE

The translator contains a mercury wetted reed relay and will not work unless
mounted vertically.

CHANGES TO THE NUMBER STORE

Customers are permitted to make their own changes to stored numbers and they should be encouraged to do so. When a customer specifically asks the PO to change one or more numbers in the store, the request should be directed to the Sales Divn where an Advice Note will be issued for the work to be completed by the Installation Group.

Requests for maintenance staff to make changes to the number store when they are at a customers' premises for other work should be met and the charge raised by way of the A864 procedure (See Booklet A44).

TO SET UP TELEPHONE NUMBER

Write the number down and tick each digit as it is connected. Select the key to be used, the translator tags for keys 1-16 are the left hand side and for keys 17-32 the right hand side of the translator.
Connections can now be made using Connectors 1001A (use same colour for each separate address) between the tags associated with the key and the digit bars (centre of translator).

Tag 1 of the key is connected to the bar representing the first digit of the number, tag 2 to the second etc. When all the digits have been connected the next tag is connected to the stop bar.
See fig. 7 opposite. **Button 1** shows a PABX extn or DEL Autodial, connected to Address 4198 i.e. PABX Extn 4198 or own Exchange 4198.

PABX Extensions. If the Callmaker is connected to a PABX extension and the call being set up is to be via the public exchange, the 'Access' tag is connected to the bar marked 'EXCH', this provides the digit which is dialled for the public exchange. **Button 2** fig. 7 shows an example of a PABX Extn connected to Address 9.2570.

International Calls the 'Access' tag is connected to the 'ISD' bar. This provides the code '010' - or, in the case of PABX extensions, the public exchange code followed by '010'. **Button 3** fig. 7 shows an International Address Paris 24680 i.e. 010.33.1.24680.
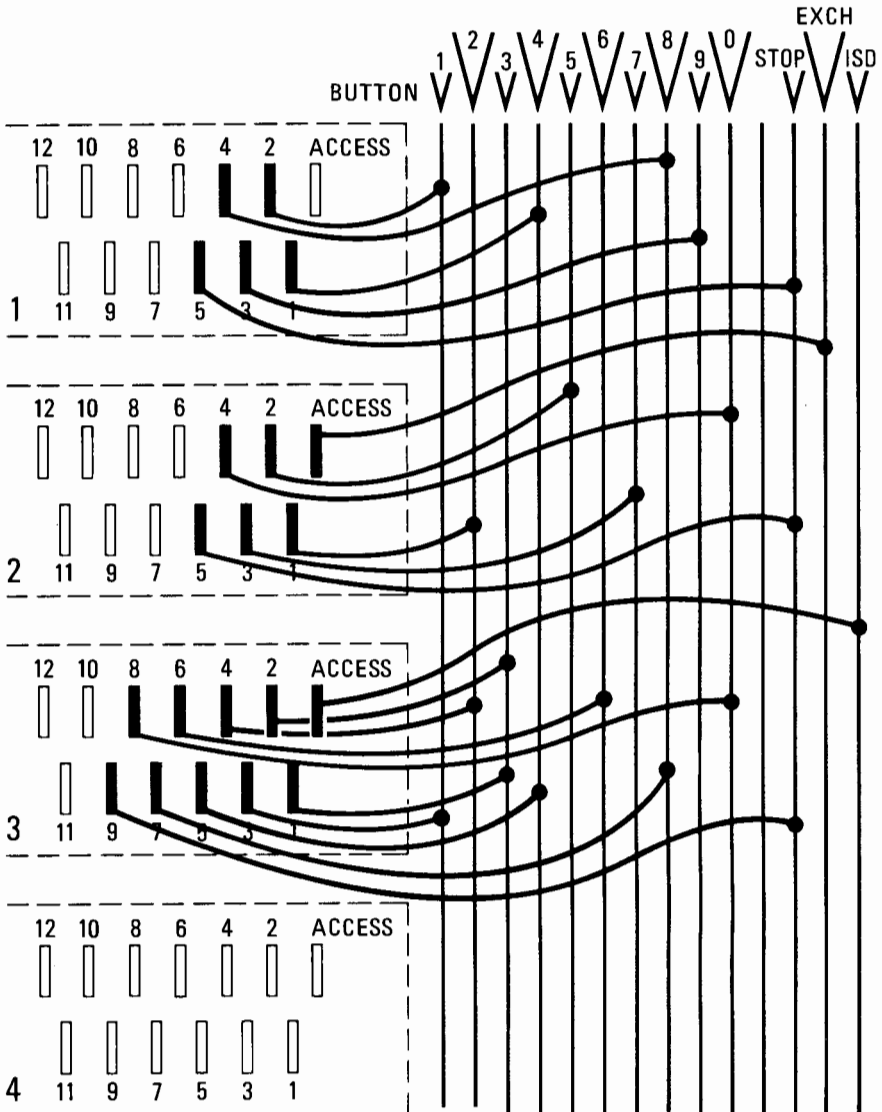
7

TRANSLATOR 1A EXAMPLES OF JUMPERING

Fig.7

AUTODIAL 201A (TAPE CALLMAKER)

Fig.1

TAPE DRIVE
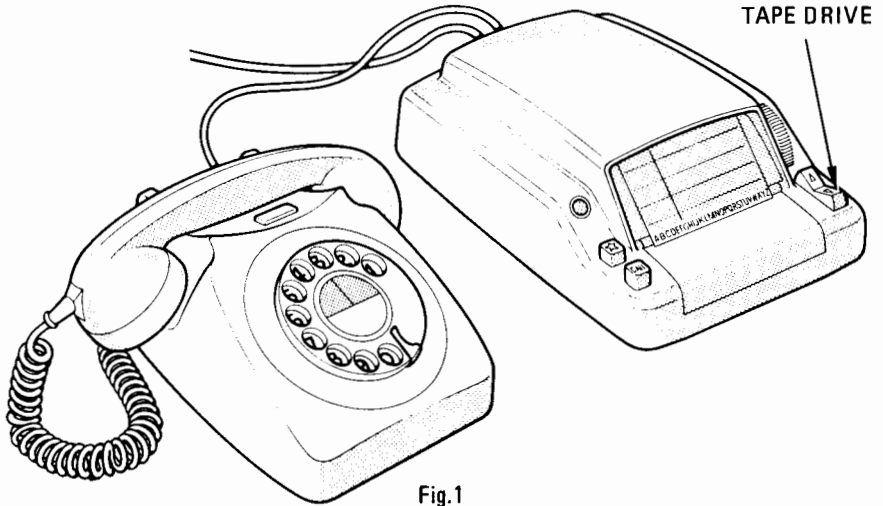
FACILITIES

a. Can store up to 400 customers numbers, each up to 16 digits long, on magnetic tape.

b. Pulses out digits in standard form with pulses corrected where necessary to 10 pps with Break/Make ratio 2:1.

c. Inserts minimum intertrain pause of 600mS.

d. Provision can be made for access code (ie 9 on PABX) with automatic stop after code, to wait for dial tone.

e. Quick to find numbers with motorised drive to scan tape and final selection by hand.

f. Calls controlled in usual manner ie Handset off telephone.

TO MAKE A CALL

a.   Ensure mains is switched "on" to the power unit.

b.   Move tape to the required name by pressing tape drive key for rough adjust-
      ment (watch red line on letter required) then to actual name use manual
      control, name to be called positioned between the guide lines of the window.

c.   Lift handset and wait for dial tone.

d.   Press call button, the lamp glows whilst the number is being pulsed out.

e.   After the number has been pulsed out the call continues as normal.

f.   PABX extensions, after the access code has been pulsed out the recorder will
      stop and wait, when dial tone is returned from the public exchange press the
      star button and the rest of the number will be pulsed out.

TO MAKE A RECORDING

a.   Plug dial into rear of desk unit.

b.   Move tape to an appropriate point, then lift the flap on the desk unit and
      write in name and number to be recorded, using a soft pencil.

c.   Now move the tape until the space you have written on is between the guide
      lines across the window.

d.   Press the call button and when the lamp darkens dial the first digit of the
      number.

e.   When the light darkens again dial the next digit, repeat in this manner until
      the whole number has been dialled.

f.   Press the star button . Unplug the dial.

PABX EXTNS

Make a recording as in a - d shown above this inserts the access code (usually 9)
then press the star button, when the light darkens continue to dial the number
as usual.

Previous recordings, or mistakes when recording are automatically erased when a
fresh number is dialled.

SIMPLIFIED CIRCUIT OPERATION

Fig.2
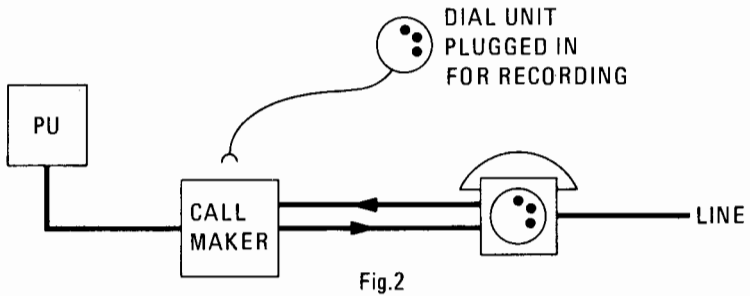
RECORDING

The dial unit is plugged in, putting a full earth on the record head. The call button is then pressed, this disengages the return clutch and allows the head to return to the extreme left of the tape. The release of the call button provides circuitry for the wait lamp and the tape head drive for 800 m Secs. The number is now dialled; on the return of the dial the start switch (Auxiliary Contact on dial) signals to start the tape motor and light the wait lamp. The pulsing contacts then give disconnect pulses of earth to the head causing changes of magnetic field on the adjacent tape.

At the end of the Pulse train the motor continues for 600 mSec so as to give an Interdigital pause. The wait light now darkens and the next train of digits can be dialled.

TAPE WITH 3461 DIALLED

Fig.3
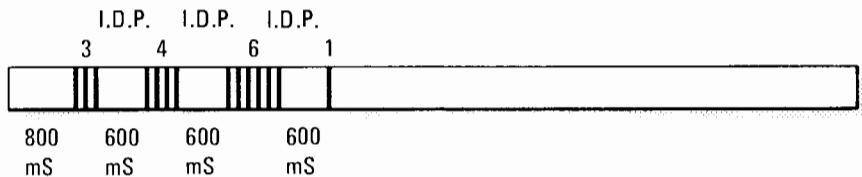
PLAYBACK

The tape is moved to the selected number. The handset is lifted and a loop is sent to line via the telephone, the Autodialler pulsing Contacts, and the ordinary telephone dial. Dial tone is returned.

The Call button on the Autodial is then pressed, this returns the head to its extreme left.
When the button is released, the lamp lights and the tape head scans the tape, as each change of magnetic field is detected a 60 mS disconnection is pulsed to line via the telephone circuit. This continues for each pulse.
The head continues looking for Pulses, if none are found after 1 sec. the tape head drive cuts out. The call then continues as for a normal call.
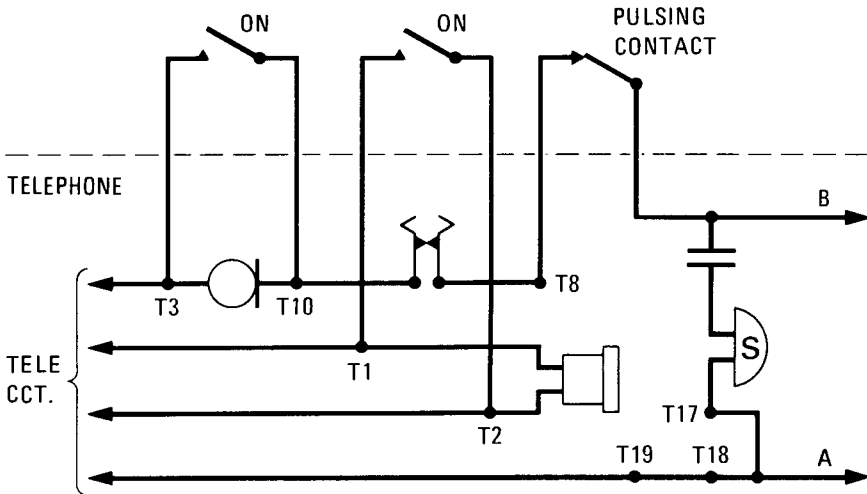
AUTODIAL

Fig.4

The mask or "off normal" contacts serve the same function as those in a normal dial i.e. stopping clicks in receiver, damage to transmitter, Anti Bell tinkle, and providing spark quench of the pulsing contacts.

MAINTENANCE

Maintenance is limited to changing complete units except for cords, lamps, fuses and tape.

The Autodial 210A consists of 3 items

Dial Unit	SA5203
Power Unit	SA5203
Translator	SA5203

which are in themselves one Rate Book item.

DESK UNIT

To inspect the desk unit remove the screws from each corner of the base and take off the cover, the cords can then be checked and changed if necessary. The Lamp (which is a push fit) can also be checked and changed.
Lamps and cords can now be obtained if required from PO Factories division. (See T1 E5 F3212 Issue 3).

The Recording head can be observed by either removing the cover as above, or by removing the cassette cartridge (press cassette release roller as shown in fig. 5).

When the call button is pressed the tape head will move across the tape from left to right for about 3.5 secs. This action will take place on blank tape or even if the cassette is removed, regardless of whether the handset is on or not. If digits are recorded then it will move across the tape pulsing each digit in turn.
If these actions do not take place the complete Deck unit should be changed.

When changing the desk unit the original cassette should be retained, if fault free, so that it can be used in the new callmaker. The new callmaker should then be thoroughly tested to ensure that wrong numbers are not sent out to line due to possible misalignment of the tape head on the new machine. Only when test calls show that the original will not function in the new machine should a blank cassette be left with the customer thus necessitating re-recording. In any event a cassette either, old or new, should be returned to the stores in the exchanged desk unit.

IF ANY TEST CALLS ARE MADE WHICH INCLUDE METERING THE CUST—OMER SHOULD BE CREDITED IN THE NORMAL WAY.

CHANGING MAGNETIC TAPE

To replace the tape (Tape recording 4A).

Remove Cassette from Unit by pressing the release roller.

Remove the four Cassette base screws. Wind the tape fully to the 'Z' end and detach the tape from the 'A' end by lifting the masking tape - the A end will rapidly unwind. Now remove the tape from the Z spool.

Take the 'A' end of the new tape and fix this to the A spool with masking tape, now wind the tape onto the spool in the direction shown by the arrow. When all the tape is wound on the other end should then be threaded around the toothed drive wheel rollers towards the Z end.

The Z spool should then be tensioned by winding it about 40 times in the opposite direction to that shown below, whilst tensioning the Z spool the A spool should be held to prevent the wound on tape from slipping.

The Z end of the tape is then fixed with masking tape. The base is then refitted and the Cassette can be replaced in the desk unit. A test number should be dialled in, and then pulsed out to ensure correct operation.

ARROWS ON END OF SPOOLS
SHOW NORMAL TAKE-UP
VIEWED THROUGH WINDOW   DIRECTION
UPPER SURFACE OF   UNDERSIDE OF
MAGNETIC TAPE IS   TAPE HAS BROWN
WHITE WITH BLACK   MAGNETIC MATERIAL
HORIZONTAL LINES
                                                            A END OF TAPE

CASSETTE   TOOTHED
RELEASE   DRIVE WHEEL
ROLLER   Z END
                    OF TAPE   OUTER
                                                            HINGE
                    TAPE CAN TRAVEL
                    IN EITHER DIRECTION
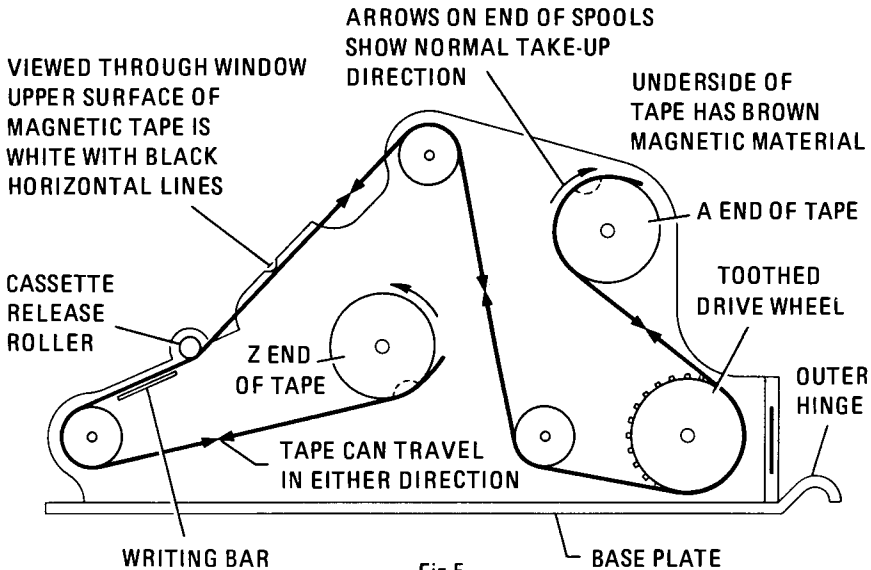
WRITING BAR   Fig.5   BASE PLATE

DIAL UNIT

The dial itself is a special item and cannot be interchanged with a normal telephone dial and complete units only should be changed.

TESTING

If wrong number faults are reported and the speed/ratio are suspected:—

a.   Drive tape to blank space and then dial onto the tape a series of O's.

b.   On the next space on the tape dial in the digits 1 - 0.

The speed and ratio can then be checked with the R.S.C. also the correct pulsing of every digit. When the R.S.C. has been contacted move tape to position (a) and press call button for speed/ratio and to position (b) and press call button for check of digits.

POWER UNIT

Maintenance consists of checking voltages and fuses.

AUTODIAL POWER UNIT
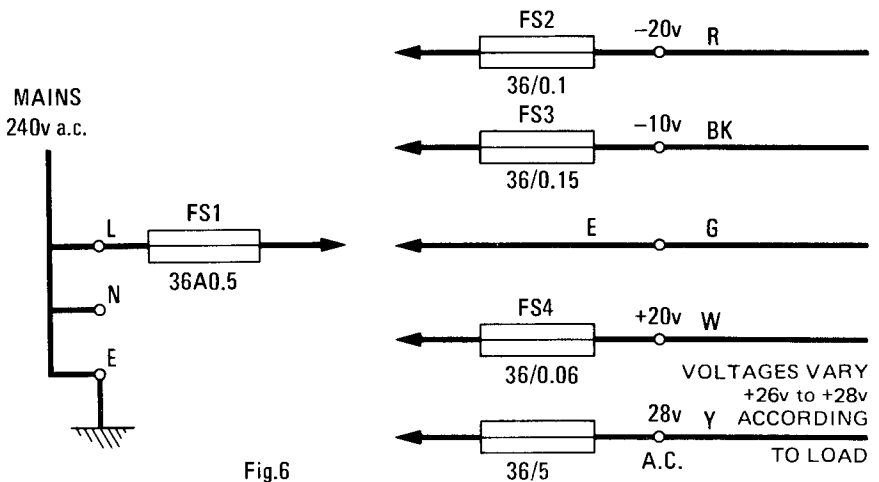
Fig.6

DO NOT REMOVE POWER UNIT COVER WITH MAINS SWITCHED ON !

15

AUTODIAL 301A/302A (CARD CALLMAKER)
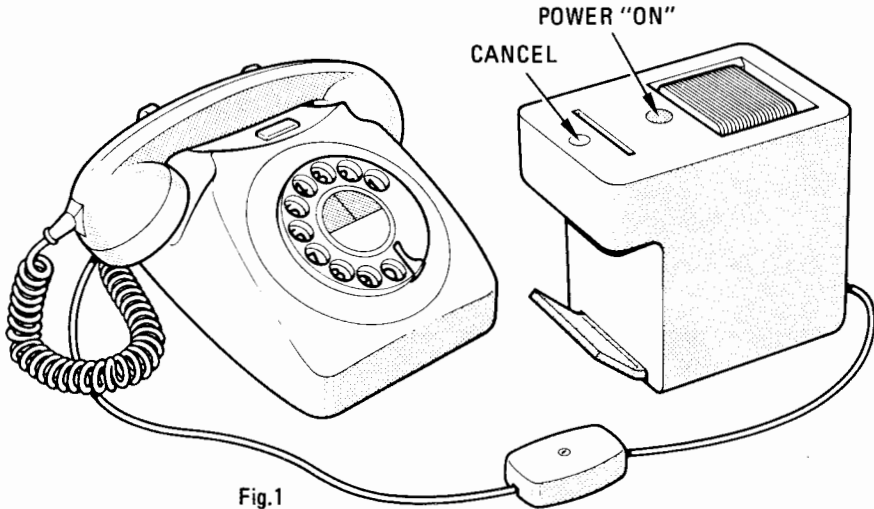
Fig.1

FACILITIES

a. Can store any amount of predetermined customers numbers on punched cards (One Card per customers number).

b. Each card can store numbers up to 16 digits.

c. Pulsing out of digits is standard loop disconnect 10 pps form Break/Make ratio 2:1 with 850 mS intertrain pause (2000 mS after Access Codes)

d. A cancel button to stop call progress and release card

e. Integral Power Unit with red lamp to indicate power on.

f. The 302A can be used on Telex.

TO MAKE A CALL

a. Check red pilot lamp is glowing to indicate power is on.

b. Lift receiver, wait for dial tone and then insert the card into the slot (name of Customer to top of Card facing you).

c. Allow to fall freely, the card moves slowly through the slot as each number is dialled and finally drops into the tray below.

d. The Call continues as normal.

NOTE

If a card gets jammed or is incorrectly inserted the cancel button can be pressed, to release the card. The receiver should then be replaced.

SIMPLIFIED CIRCUIT OPERATION

Fig.2
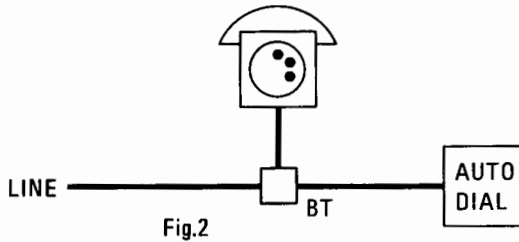
When the punched card is inserted in the slot, light shines through the punched holes onto photocells, these photocells signal to the pulse generator to pulse the required number. After the number is pulsed out the generator stops and an interdigital pause of 850m/sec is given. The latch on which the card rests is released and the other latch is operated allowing the card to drop, so that the next row of holes is in front of the photocells. This is repeated for each digit first one latch releasing then the other until all the numbers have been pulsed out and no punched holes are presented to the photocells, causing both latches to release and the card to fall from the slot.

The cancel button also operates both latches and releases the card.

SIMPLIFIED ELEMENT

Fig.3   EXPLANATORY ONLY
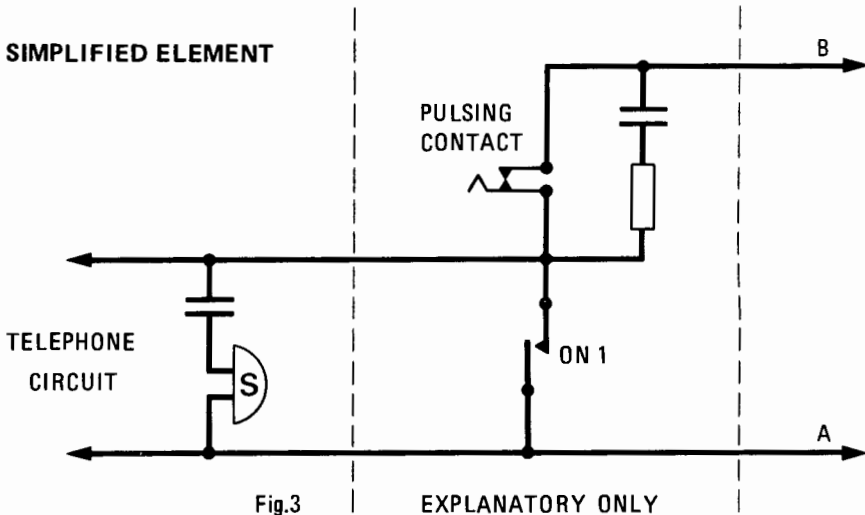
TO PREPARE CARD

On the matt surface at the top of the card write the name of person to be called.

Above the top row of circular marks write the digits you would dial to obtain the required number see fig. 4.

Insert the card in the jig as in figure 5 (All Customers are provided with jig on installation) Align the first digit on the card with the corresponding figure on the jig.
Punch out the holes below this figure.
Repeat for each digit required.

The digit X is used to give a long interdigital pause of 2000mS after the access code (9 on PABX's).

Cards can be prepared without the jig, fig. 7 shows the holes to be punched for each digit.
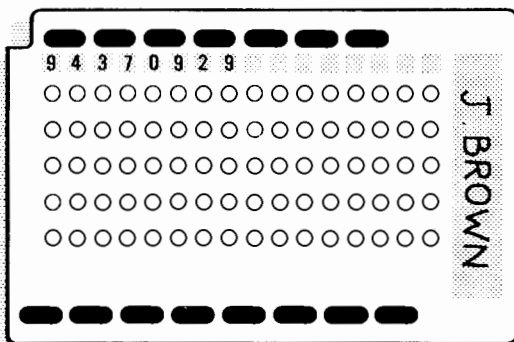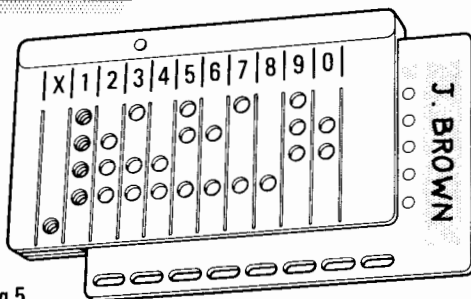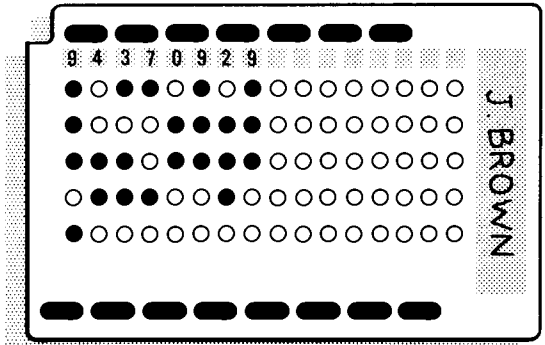

Fig.4

Fig.5

Fig.6

Fig. 6 shows a card prepared for calling 4370929 from a PABX extension. With a long IDP of 2000mS after access code (9).
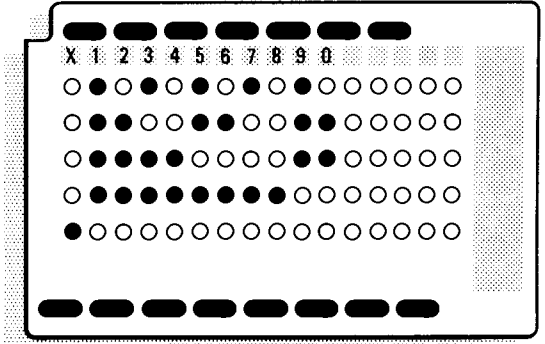

Fig.7

The Card shows the holes to be punched for all digits.

TESTING

Each maintenance officer concerned should carry two pre-punched cards with him for testing purposes. One card should carry a local test number and the second the digits 1 to 0. This second card should be punched to provide a long inter-digital pause (2000 mS) after each digit. Where the installation is at a PBX, the exchange access digit must be dialled manually before insertion of the cards. All metered test calls should be credited in the normal way.

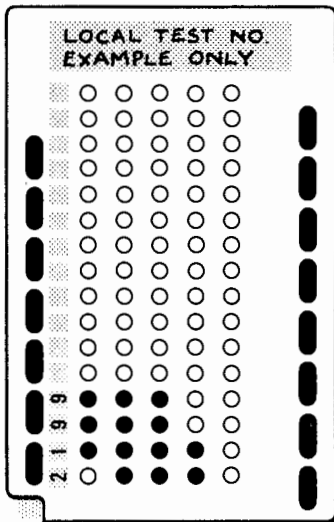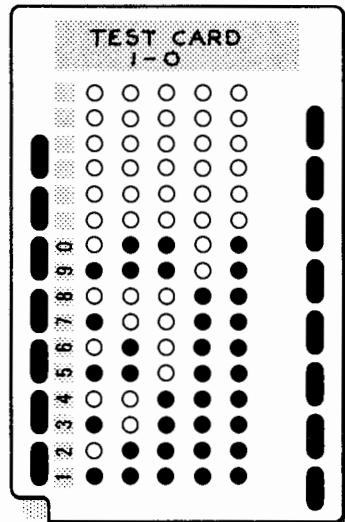Examples of such cards are shown below.

Fig.8

Fig.9

MAINTENANCE

Should the Autodial fail to operate on insertion of a card, check the Red Opal is glowing, if not check:

a. The Mains supply is on and supplying the Autodial.

b. The fuse in the Autodial - 48/0.15 for 301A,   72/0.16 for 302A

c. The lamp (No.54A) is working and is also fitted correctly. If it is not fitted correctly uneven light can reach the Photocells and wrong numbers could occur.

The top of the Autodial when removed, can have a similar effect because it reflects light towards the cells.

Access can be gained for checking fuses and lamps by removing the 3 screws 'A'.
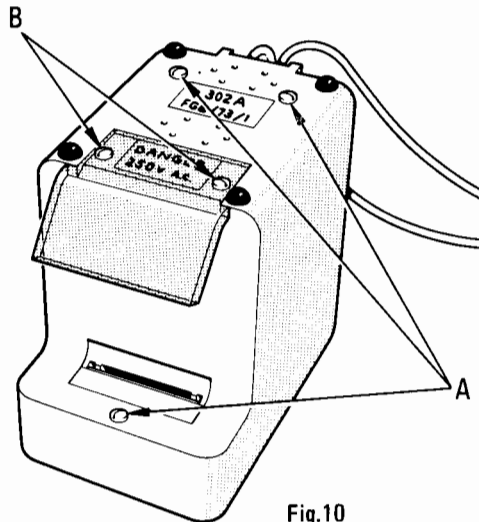

Fig.10

Access for cords and leads also remove 2 screws 'B' in the card slot projection.

SWITCH OFF MAINS BEFORE DISMANTLING!

If faults cannot be cleared in this limited way the faulty set should be maintenance exchanged at Section stock in the normal way.

SECTION 4

REFERENCES

SECTION 1
Autodial 101A (Key Callmaker)

        T1   C3 M0035 (Description)
                E5 F2315 (Maintenance)
                E5 A0015 (Parts)

        N   Diagram N2310
                Diagram   SA9199 and Notes
                Works specification SW 2092 (Installation)

SECTION 2
Autodial 201A (Tape Callmaker)

        T1   C3 M0040 (Description)
                 E5 F3212 (Maintenance)

        N   Diagram N2311
                Diagram SA 5203 & Notes

SECTION 3
Autodial 301/302A (Card Callmaker)

        T1   C3 M0045 (Description)
                 E5 F3219 (Maintenance)

        N   Diagram N2313