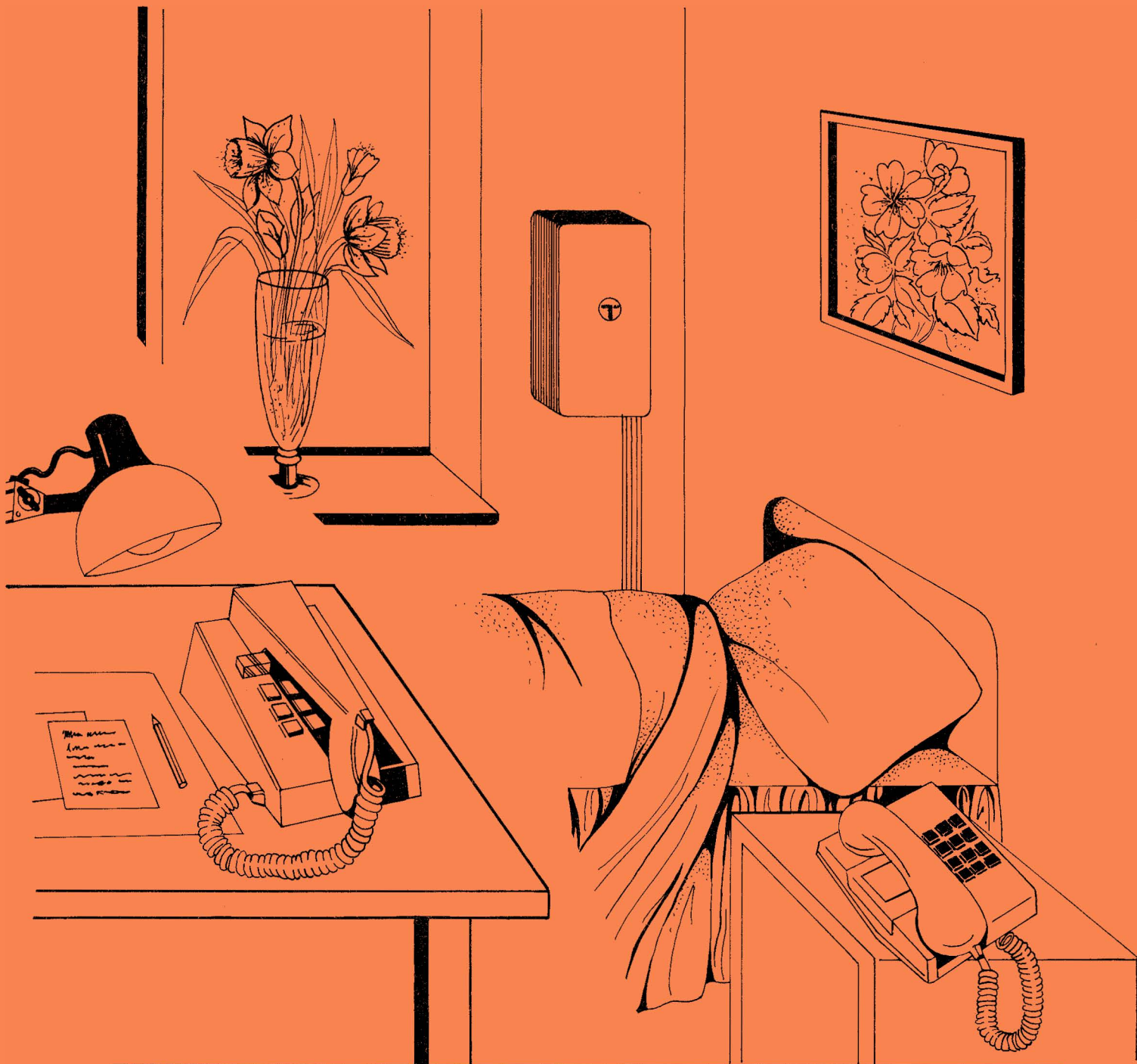


NOT TO BE SHOWN OUTSIDE BRITISH TELECOM

# MINIMASTER 1 (1+6)

SMALL ELECTRONIC SWITCHING SYSTEM  
FOR HOME OR OFFICE





# MINIMASTER 1 (1+6)

These guide notes have been designed to assist Field Staff with the installation and maintenance of Minimaster 1. To gain maximum benefit from them they should be read completely, by both Installation and Maintenance staff.

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PRODUCED BY IDHQ/IT5.1.2.2.  
NOVEMBER 1982



## 1. GENERAL DESCRIPTION

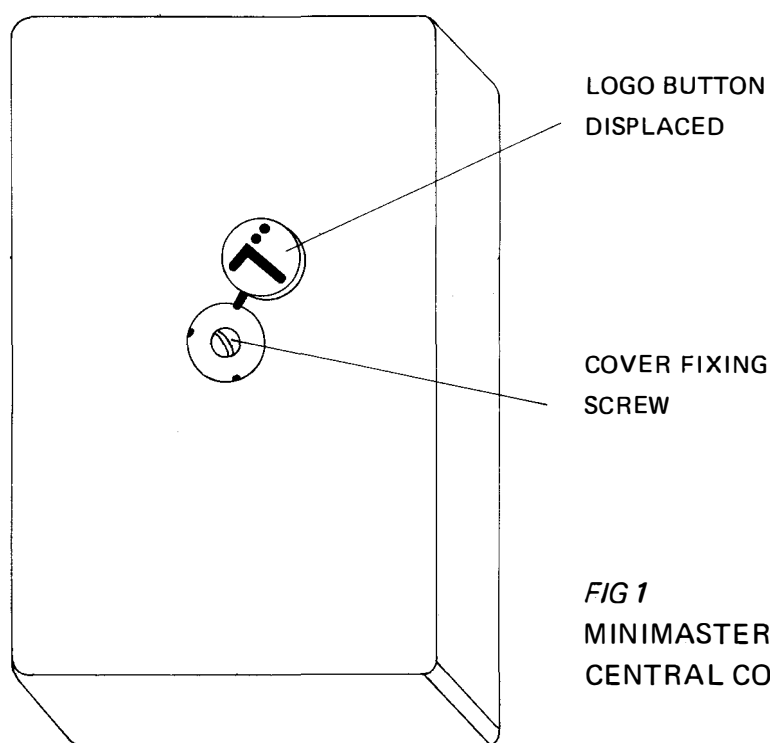
The Minimaster 1 is a mains powered microprocessor controlled switching system of 1 + 6 capacity. The system comprises a wall mounted Central Control Unit (CCU) with one line, which may be connected as either a direct exchange line or as an extension off a PBX, and up to six two wire telephones. When connected as a PBX extension only earth loop recall may be used.

The CCU (*see fig. 2*) measures approximately 300 mm high, 200 mm wide and 75 mm deep and weighs 2.5 kg. The CCU contains:

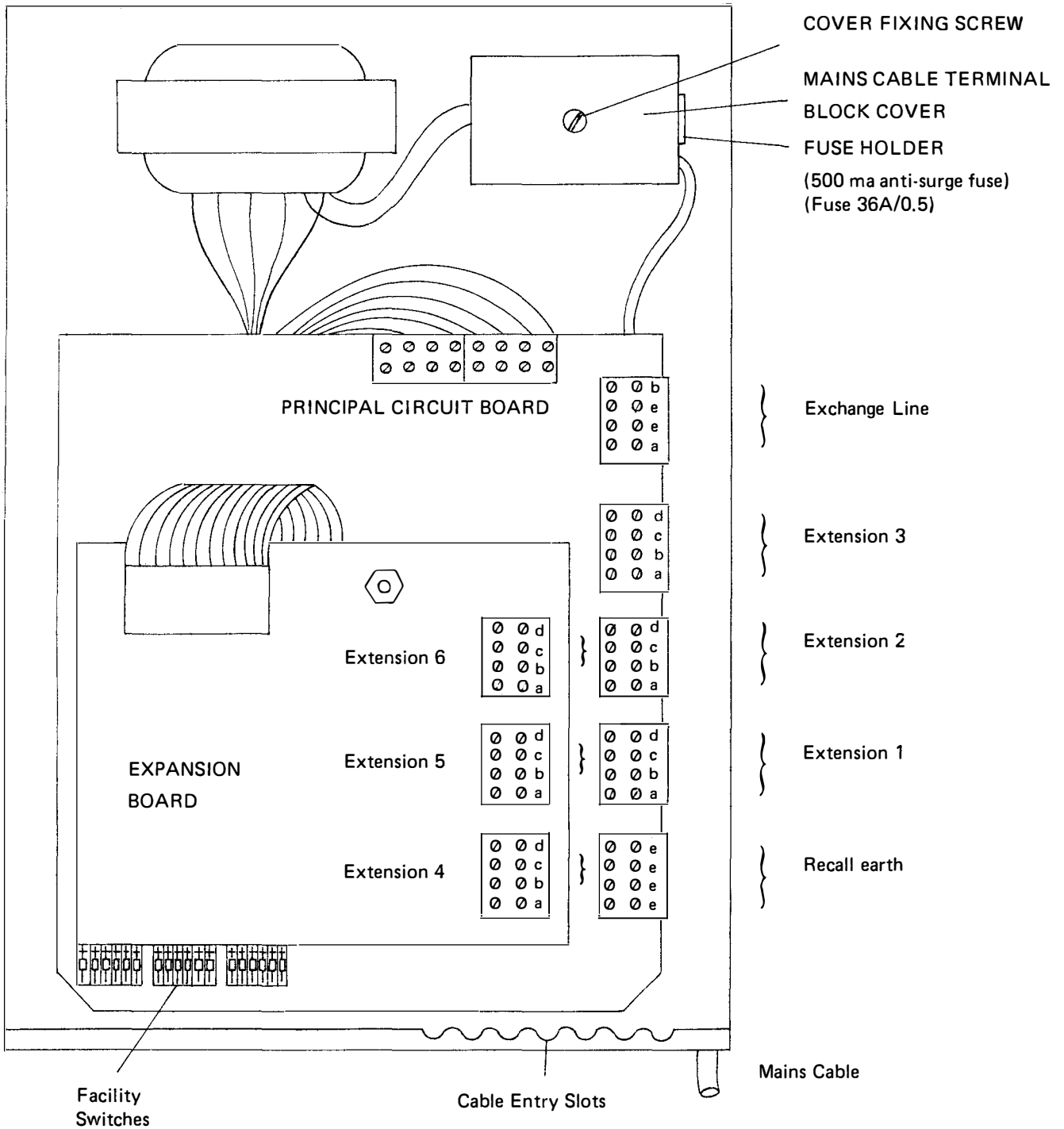
- a. the principal circuit board which carries all the circuitry and terminal blocks for a system with one line and three extensions;
- b. the expansion board which carries circuitry and terminal blocks for three additional extensions;
- c. the power unit which is connected to a 3 metre long mains cable with mains plug fused at 3 amps.

The telephones which are star connected to the CCU may be any standard telephone using loop/disconnect pulsing. Difficulty may be experienced in obtaining a satisfactory operation of the tone caller of "Sceptre" telephones and Statesman telephones may cause "wrong number" problems on "divert", consequently these telephones should not be used with Minimaster systems. A recall button giving earth loop recall may be required for PBX working.

Battery powered Keyphones e.g. X-Press Callmaker, require Power Unit charging arrangements.



**FIG 1**  
**MINIMASTER 1**  
**CENTRAL CONTROL UNIT**



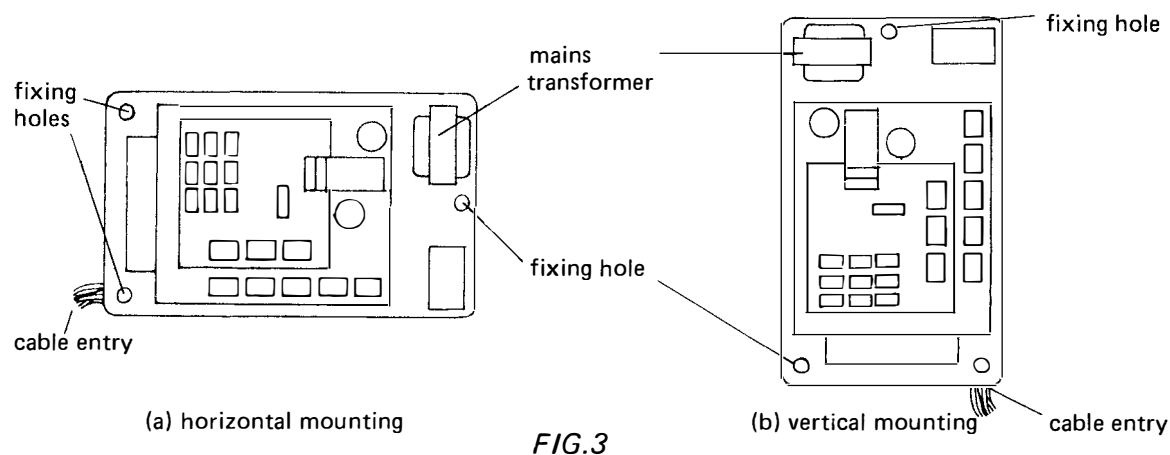
NOTE. Terminal blocks are a push fit on pins on the printed circuit boards.

FIG 2  
GENERAL ARRANGEMENT OF CCU

## 2. INSTALLATION

Installing the CCU. Do not connect the mains supply to the CCU until all wiring & cabling is completed. First remove the cover by prising out the central BT logo button using a Screwdriver Instrument No. 1, loosen the cover fixing screw and lift the cover clear, (*see fig. 1*).

The CCU should be screwed to a suitable wall surface using the three fixing holes in the base. To avoid overheating make certain that the mains transformer is at the top. *Fig 3* shows the two permitted methods of mounting the CCU.



### PERMITTED MOUNTING OF CCU

After fixing the CCU and before cabling the system, remove the cover from the mains cable terminal blocks (*see fig 2*) and check that the cable is correctly terminated with the

- green yellow conductor to Earth (E) terminal
- the brown conductor to Live (L) terminal
- the blue conductor to 240V terminal

After checking the terminations of the mains cable replace the terminal block cover.

### Wiring

All cables enter the CCU via slots in the lower edge (when mounted vertically) of the back plate and are fed through guides on the right hand side of the unit. The cables terminate under screw terminals on the appropriate terminal block (*see fig. 2*) which are a push fit on pins on the printed circuit boards.

Extensions are wired as ordinary two wire telephones with the cables connected to terminals A and B of the terminal block. At the extension, cables may be either connected to "Phonesocket" master line jacks or to block terminals if required. An extension may be provided with two high impedance telephones connected as a Phonesocket installation, using a secondary line jack for the additional telephone.

## Earth Recall

If the system is connected to a PBX with earth loop recall, a signalling earth must be connected to the CCU. The earth should be connected to either of the terminals marked 'E' on the exchange line terminal block. The earth is fed to each extension telephone from any of the terminals on the "Recall Earth" block and the second 'E' terminal on the exchange line block. *Note:* with six extensions it will be necessary to connect two extensions to the same earth terminal.

## CABLING DISTANCES

To ensure satisfactory operation of the system:

- a. the maximum loop resistance for an extension with earth loop recall is  $60\ \Omega$ . This is equal to a 355 metre run of 0.5 mm copper cable;
- b. the maximum loop resistance for extensions where recall is not provided is  $100\ \Omega$ , equivalent to a 595 metre run of 0.5mm copper cable;
- c. if the conference facility is not to be used the maximum loop resistance for extensions may be increased to  $500\ \Omega$ , equal to 2975 metres of 0.5 mm copper cable.



### 3. "SETTING UP" THE SYSTEM

When the installation wiring has been completed and before the CCU cover is replaced the system should be "set-up". A block of eighteen "safety pin" type switches is mounted at the lower left hand corner of the CCU, see *fig 2* and *figs. 4* and *5*.

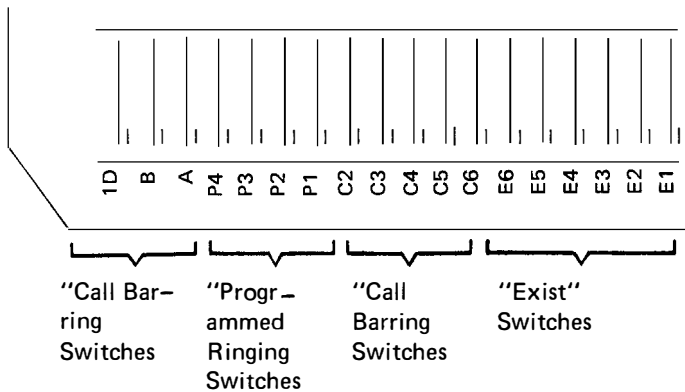


FIG.4  
ARRANGEMENT OF  
FACILITY SWITCHES

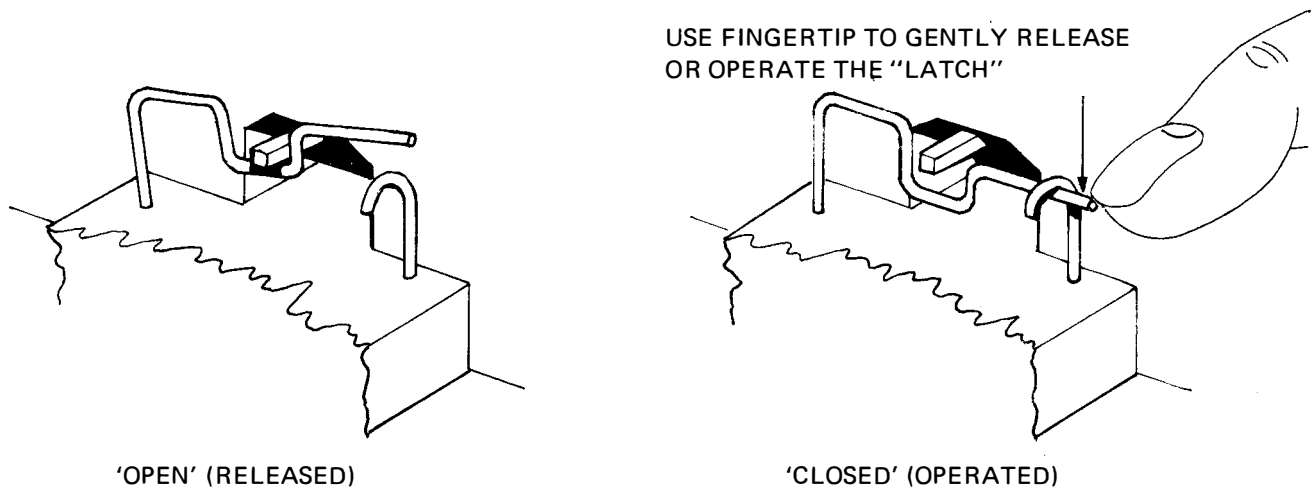


FIG.5 SAFETY-PIN TYPE SWITCH

#### "Exist" Switches.

"Exist" Switches. Switches E1 to E6 are used to open the extensions for use. For an equipped extension the relevant E Switch must be open, if an extension is not provided the E switch must be closed. This is to ensure that the correct tone is returned to the caller. Should a spare extension number be inadvertently dialled NU will be returned, if the extension is "open" ringing will be connected and ring tone returned to the caller.

**“Programmable Ringing”.**

Switches P1 to P4 provide a choice of five ringing programmes. With all the switches P1 to P4 “open” an incoming call is presented to extension 1 for six periods of ringing. If the call is unanswered it is then presented to extension 2 for four periods of ringing, then to extension 3 for four ringing periods. If still unanswered the call is then presented to extensions 4, 5, and 6 in turn, each for two periods of ringing. This cycle is then repeated until the call is answered or abandoned. Table 1 shows the alternative ringing programmes.

P Switch Operated	NUMBER OF RINGING PERIODS					
	6	4	4	2	2	2
None	Extn 1	Extn 2	Extn 3	Extn 4	Extn 5	Extn 6
4	Extn 1	Extn 3	Extn 5	_____	_____	_____
3	Extn 2	Extn 1	Extn 3	Extn 4	Extn 5	Extn 6
2	Extn 2	_____	_____	_____	_____	_____
1	Extn 1	_____	_____	_____	_____	_____

**TABLE 1 – Programmable ringing sequence**

**“Call Barring”**

Switches A, B and C2 to C6 are used with the “Call Barring” facility. There is a choice of four options of barring with two groups of barring within each option. Once an option has been selected, it will apply to all extensions in the system, but there will be the choice of two groups within that option for each extension. *Table 2* shows the call barring options, note that Extension 1 cannot be barred.

Switch ID selects the appropriate International Dialling code. With switch ID open code 00 is selected, with switch ID closed code 010 is selected. ISD barring bars dialled ISD calls, it does not bar International Operator access.

*(SEE PAGE 7 – FOR TABLE 2)*

### OPTIONS

Extn No.	Open Barring Switch	Full Access / Full Barring			Full Access / ISD Barred			ISD Barred / ISD & STD Barred			ISD Barred / Full Barring		
		Switch A – Open Switch B – Open			Switch A – Open Switch B – Closed			Switch A – Closed Switch B – Open			Switch A – Closed Switch B – Closed		
		ISD	STD	LOCAL	ISD	STD	LOCAL	ISD	STD	LOCAL	ISD	STD	LOCAL
2	C2 Open	✓	✓	✓	✓	✓	✓	X	✓	✓	X	✓	✓
	C2 Closed	X	X	X	X	✓	✓	X	X	✓	X	X	X
3	C3 Open	✓	✓	✓	✓	✓	✓	X	✓	✓	X	✓	✓
	C3 Closed	X	X	X	X	✓	✓	X	X	✓	X	X	X
4	C4 Open	✓	✓	✓	✓	✓	✓	X	✓	✓	X	✓	✓
	C4 Closed	X	X	X	X	✓	✓	X	X	✓	X	X	X
5	C5 Open	✓	✓	✓	✓	✓	✓	X	✓	✓	X	✓	✓
	C5 Closed	X	X	X	X	✓	✓	X	X	✓	X	X	X
6	C6 Open	✓	✓	✓	✓	✓	✓	X	✓	✓	X	✓	✓
	C6 Closed	X	X	X	X	✓	✓	X	X	✓	X	X	X

**TABLE 2 – CALL BARRING OPTIONS**

## 4. FACILITIES

The system generates the following tones which are used in conjunction with the available facilities.

### Tones

Dial Tone	A continuous tone of 350 Hz and 440 Hz.
NU Tone	A continuous tone of 440 Hz.
Engaged Tone	440 Hz tone 140 m secs ON 140 m secs OFF.
Direct Tone	A 350 Hz continuous tone mixed with 440 Hz tone interrupted 1 sec ON, 70 m secs OFF.
Ringing Tone	440 Hz tone interrupted 500 m secs ON, 1 sec OFF.
Ringing Current	The system also generates its own ringing supply. This is a 70 v peak to peak supply of 20 Hz applied at the same cadence as the system ringing tone.

### Facilities

The following facilities are available to all extensions:

- a. Intercom calls
- b. Outgoing exchange line calls
- c. Receive incoming exchange line ringing
- d. Answer incoming exchange line calls
- e. Hold exchange line calls
- f. Transfer exchange line calls
- g. Conference calls on exchange line or intercom calls
- h. Divert intercom calls

### Intercom Calls.

To make an intercom call, lift the handset and listen for system dial tone. If the intercom circuit is busy no dial tone will be heard. On receipt of system dial tone, dial the required extension number. If the called extension is free system ringing tone will be heard and ringing at the same cadence connected to the required extension. If the called extension is engaged on an exchange line call system engaged tone will be received. If the number dialled represents a non-existent extension that has been closed at the CCU then system NU will be received. If the spare extension has not been closed at the CCU no tone will be heard.

Intercom calls are secret from the exchange line and no extension can gain access to the intercom circuit when it is in use, unless invited to join a conference.

The intercom circuit releases as soon as either user replaces the handset (first party clear). The intercom circuit is "timed-out" (released) if the caller does not dial within 10 seconds of receiving intercom dial tone. The circuit is then available for another call.

### **Outgoing Exchange Calls.**

To make an outgoing exchange line call, lift the handset and on receipt of system dial tone dial digit 9. If the exchange line is free it will be connected and exchange dial tone will be received. If the exchange line is busy no tone will be heard after dialling '9'. When exchange dial tone is received, dial the required code and number. The required number should be dialled without pausing. A pause or delay may result in the call being inadvertently transferred. If a barred code has been dialled the caller will receive no tone, the exchange line will be released by the CCU and will be available should another extension make an exchange line call.

### **Incoming Exchange Calls.**

An incoming call is detected by the CCU and system ringing is connected to the extension according to the selected ringing programmes. Any extension may answer the incoming call, if the extension is ringing, lift the handset, the call is connected automatically. If the extension is not ringing lift the handset and dial digit '8', the call will then be connected to the extension.

### **Hold and Transfer.**

An exchange line call may be held by either:

- a. dialling your own extension number. The exchange line will be held and the extension handset may be replaced. The CCU will ring the holding extension once every 20 seconds to remind it that the exchange line is being held. The extension may return to the exchange line by lifting the handset and dialling digit 7. Similarly any extension may access the exchange line by dialling '7'.
- b. dialling another extension number. The exchange line will be held and an intercom enquiry call made to another extension. This enquiry call is secret from the exchange line. Either extension can gain access to the held exchange line by replacing the handset momentarily, and on lifting the handset dialling digit '7'. If the intercom circuit is already in use when an exchange call is to be held, dialling an extension number will result in no tone being received. To return to the exchange line the holding extension replaces the handset momentarily and on relifting the handset dials digit '7'.

### **Divert Intercom Calls.**

Any extension can arrange for intercom calls to be diverted automatically to another extension.

To divert calls the diverting extension lifts the handset and dials 'O' followed by the number of the extension to which intercom calls are to be transferred. The diverting extension can continue to use the telephone as normal but can only be called by the extension to which his calls are transferred. While the divert facility is in effect the transferring extension receives interrupted dial tone on lifting the handset as a reminder that transfer is still in effect. To cancel "divert" the diverting extension lifts the handset, dials digit O and then replace the handset.

### **Conference.**

A conference call can be set up either between three extensions *or* two extensions and the exchange line.

To set up a conference an intercom enquiry call is made and the called extension invited to join the conference. To join the conference the invited extension dials his own extension number.

### **Mains fail.**

Under mains fail conditions extension 1 is connected to the exchange line and can make and receive exchange line calls. Intercom calls are not possible during mains fail periods. If extension 1 is using the exchange line when the power supply either fails or is restored, the call will be unaffected.

## 5. MAINTENANCE

Maintenance of the Minimaster 1 is limited to functional testing, replacement of the power unit fuse or changeout of the CCU, maintenance of the extension telephones being the same as for standard instruments.

When a Minimaster 1 is reported "out-of-order" the customer should be asked to switch the power supply off for approximately 10 seconds and to check the operation of the system when the supply is reconnected. Every attempt should be made to ensure that the customer is aware of the facilities of the system and that fault reports are not due to misoperation.

The CCU comprises a Principal Circuit Board, an Expansion Board and a power supply transformer.

The Principal Circuit Board comprises the microprocessor, power and tone supplies, termination and switching matrix for a system of 1 exchange line and 3 extensions. It is mounted on four plastic clips, one at each corner.

The expansion circuit board extends the system to a 1 + 6 by adding the terminations and switching matrix for 3 more extensions. It is mounted on 4 insulated pillars fixed to the principal board and is connected to the principal circuit board by means of a plug ended ribbon cable.

All line terminal blocks are connected to their respective circuit boards as "push on" connexions to printed circuit board pins. The blocks may be prised off the circuit boards to save disconnecting the line and extension terminations when changing circuit boards.

The power supply must be switched off before the fuse is removed or replaced and before the circuit boards are changed.

Switch SW1 on the expansion board should be set with the "normal" contact closed and the "door" contacts open. These contacts and links LKA - LKF relate to facilities not offered by the BT Systems.

When a CCU is changed particular care must be exercised to ensure that all configuration switches are set in the same way as those on the recovered unit. This is important as it ensures that all facilities remain unaffected.

The Minimaster 1 contains a non-divided transmission bridge and consequently problems may be encountered due to parallel working of extension. These problems are likely to occur if there is a mixture of dial telephones with carbon microphones (Transmitter 16A) and line powered press button telephones or telephones with microphones 21A fitted. If problems do arise then all telephones should be changed to high impedance types with microphones 21A.

When tested by the RSC the exchange line tests normal line connections, but due to the presence of a "surge protector" the line will test "low loop" if a "megger" test is applied.

The Minimaster 1 may be affected by short-term power breaks or surges and should not share a mains socket with any other appliance, especially one containing electric motors or other inductive loads.

Central Control Units that have been maintenance exchanged should be carefully re-packed using the packing of the replacement item. Full fault details should be included ("out-of-order" is not sufficient), and if the item is within warranty period, i.e. within 18 months of the date stamped on the back of the item it should be returned to the manufacturer.

Any unusual defects or difficulties should be reported via Regional Service Groups using the A646 procedure.

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**PERSONAL NOTES**

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