

**INPHONE™
SWITCHING SYSTEMS**

INSTALLATION GUIDE

EMBLEM



British
TELECOM

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SWITCHING SYSTEMS.**

INSTALLATION GUIDE

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TELECOM

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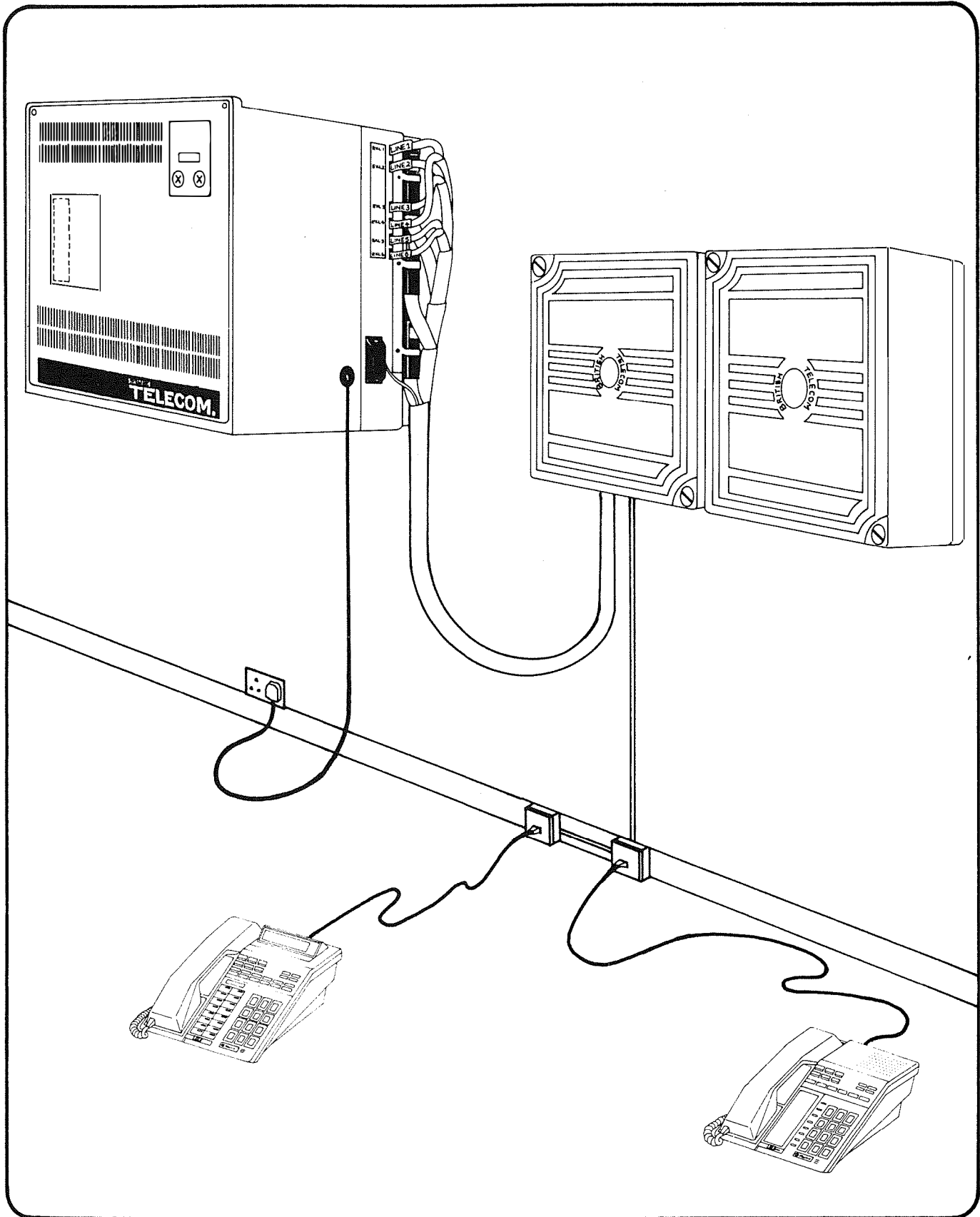
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EMBLEM Switching System



WARNING This equipment contains Electrostatic Sensitive devices

Static - What is it?

Static is a naturally occurring phenomenon that can exist on any material. Its most dramatic appearance is in the form of lightning.

You create static charges on your body with every movement you make. The average body charge is in the order of 1kV. You cannot feel anything, but it is there. To feel a static shock the level must reach 7kV, and to see or hear it the level must be 10kV. Much greater level of charges are possible. The Table below shows typical voltages generated by various actions. Lower humidity produces higher static voltages.

Typical Electrostatic Voltages

Means of static generation	Electrostatic Voltages	
	10 to 20% humidity	65 to 90% humidity
Walking over vinyl floor	12,000	250
Worker at a bench	5,000	100
Work chair padded with polyurethane foam	18,000	1,500

Why is it a problem?

All electronic components are susceptible to static damage or "zaps". Damage can occur to components subjected to only 100 volts static discharge. As shown in the Table this can be easily exceeded. Research has shown that the only device that does not appear to be affected is the inductor.

About 10% of failures due to static are hard zaps causing immediate component failures. These are more readily identified than the remaining 90% which are referred to as soft zaps.

These shorten the life of components and repeated zaps cause progressive damage leading to intermittent and ultimate failure of components. Faults of this type give rise to service problems which can prove difficult to isolate.

Damage to electro static-sensitive devices (ESD) can be avoided by using sound maintenance precautions.

WRIST STRAPS

The strap contains the following elements:-

- * Cuff - provides an electrical contact with your skin.
- * Lead - provides continuity between the cuff and the earth point. On this system the "ETH" Terminal on the side of the equipment may be used for the connection of the strap.
- * Series resistor - this protects you from an electric shock should you accidentally come into contact with a dangerous voltage.

Always wear a wrist strap before touching components or cards. As available from stores.

REMEMBER "Strap it - don't zap it"

"If you zap it - you can scrap it"

PACKING

Store and transport items in a static protective bag.

NOTE The bags supplied with this system have conductive layers on the inner surfaces. Single components can be stored by inserting their terminals into conductive foam.

HANDLING

Never handle devices by their terminations or touch the edge connectors of boards.

The following requirements are mandatory under the terms of the Approval.

Exchange Line connections must be via a box connection 252A.

Private Wires must be connected via a different box connection 252A from the Exchange Line connections.

Terminal plugs and sockets must not be compatible with standard Linejack units. The terminal shall be connected using Linejack Units 2/3C.

Terminal wiring must be independent of other building distribution wiring.

An earth must be provided with a permanent connection as described in section 4.4.

Central equipment must be within 15m cable distance from box connection 252A, ie cable run between 252A and 340A maximum cable length 13m.

Power fail regulations require 20% of exchange lines to be equipped for power fail working.

8 Section 3: General Description

The Emblem Switching System (formerly Merlin S2616) is supplied as a fully equipped Main Equipment Unit, capable of controlling up to six exchange lines and sixteen terminals. The system is Stored Program Controlled. The Main Equipment consists of a control box and backplane, and is supplied fully equipped with line cards, processor board and power unit. The assembly is designed for wall mounting.

Approximate External Dimensions

300mm Wide

300mm Deep

350mm High

Weight

10Kg

It has an associated box connection (Box Conn 340A) from which the terminals are radially wired via devoted cabling. The box contains pre-wired line protection units providing exchange line connections. To satisfy the Approval requirements the exchange lines and private wires must be connected via boxes connection 252A (see Fig 1 and Fig 1A).

The terminals are system dedicated and supplied in three versions.

Standard Terminal without Loudspeech (Monitor).

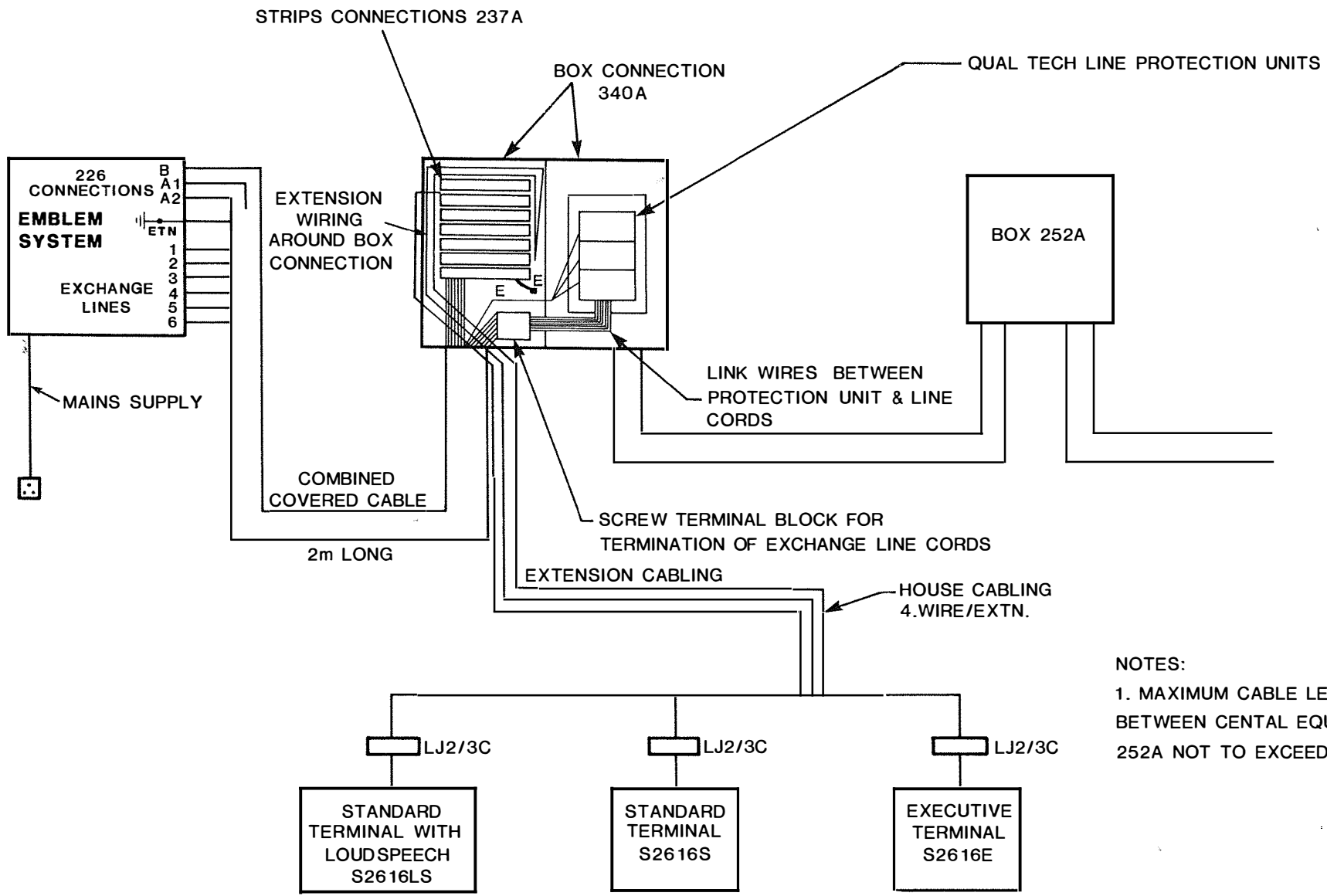
Standard Terminal with Loudspeech.

Executive Terminal.

A minimum of one Executive Terminal, connected as Terminal 10, is required for programming purposes.

For power fail Approval requirements a second Executive Terminal is required if six exchange lines are connected.

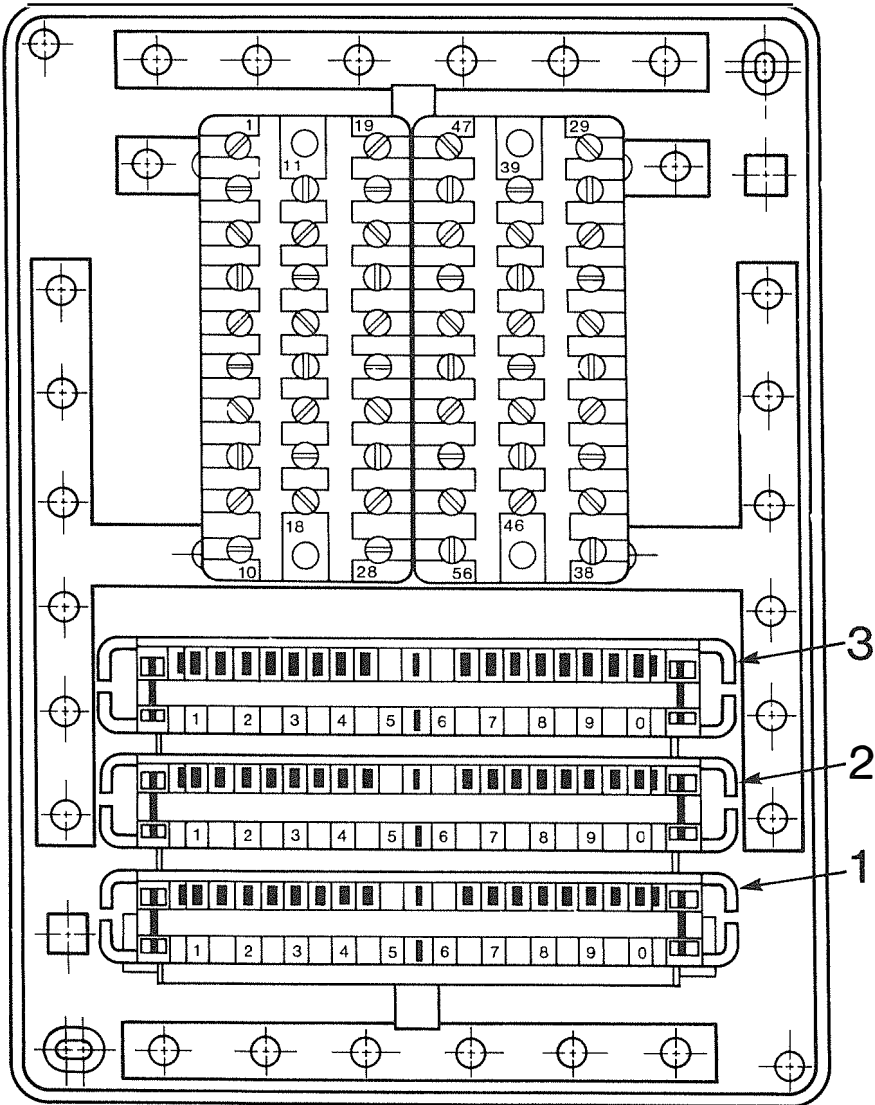
The terminal numbers correspond to those marked in the box connection (10 - 25 inclusive).



NOTES:
 1. MAXIMUM CABLE LENGTH BETWEEN CENTAL EQUIPMENT & BOX 252A NOT TO EXCEED 15m

FIG. 1 EMBLEM INSTALLATION

252A



WIRING SCHEDULE				
WIRE COLOUR	TERMINAL BLOCK 6A PIN N°	TO STRIP CONNEXION 237A		
		N°		
W-B	1	3	1	a
B-W	2	3	1	b
W-O	3	3	2	a
O-W	4	3	2	b
W-G	5	3	3	a
G-W	6	3	3	b
W-BN	7	3	4	a
BN-W	8	3	4	b
W-GY	9	3	5	a
GY-W	10	3	5	b
R-B	11	3	6	a
B-R	12	3	6	b
R-O	13	3	7	a
O-R	14	3	7	b
R-G	15	3	8	a
G-R	16	3	8	b
R-BN	17	3	9	a
BN-R	18	3	9	b
R-GY	19	3	0	a
GY-R	20	3	0	b
BK-B	21	2	1	a
B-BK	22	2	1	b
BK-O	23	2	2	a
O-BK	24	2	2	b
BK-G	25	2	3	a
G-BK	26	2	3	b
BK-BN	27	2	4	a
BN-BK	28	2	4	b
BK-GY	29	2	5	a
GY-BK	30	2	5	b
Y-B	31	2	6	a
B-Y	32	2	6	b
Y-O	33	2	7	a
O-Y	34	2	7	b
Y-G	35	2	8	a
G-Y	36	2	8	b
Y-BN	37	2	9	a
BN-Y	38	2	9	b
Y-GY	39	2	0	a
GY-Y	40	2	0	b
V-B	41	1	1	a
B-V	42	1	1	b
V-O	43	1	2	a
O-V	44	1	2	b
V-G	45	1	3	a
G-V	46	1	3	b
V-BN	47	1	4	a
BN-V	48	1	4	b
V-GY	49	1	5	a
GY-V	50	1	5	b
W-B	51	1	6	a
W-O	52	1	6	b
W-GN	53	1	7	a
W-BN	54	1	7	b
W-GY	55	1	8	a
R-BL	56	1	8	b

4.1 INSTALLING THE CENTRAL EQUIPMENT

The Main Equipment should be wall mounted on a suitable flat, sound surface. This should be within 3 metres of a mains socket outlet and should allow the central equipment to be clear of the floor and any obstructions.

Before the Main Equipment and associated box connection is fixed to the wall (ie Holes Drilled) a recommended metal detector should be used to locate any services beneath the plaster. Where necessary, consultation with the customer on the whereabouts of these services should be made.

Drill and plug four holes, suitable for No 10 woodscrews, at a convenient working height from the floor and clear of any obstructions. The holes must be 300mm apart horizontally and 200mm apart vertically.



Fit and tighten No 10 woodscrews (NOTE a space of 2mm between the wall and screw head must be left for hanging the keyhole wall bracket).

Loosen the 6 screws retaining the mounting brackets on the rear of the Main Equipment and adjust the keyhole positions to fit the screws on the wall. Retighten the bracket screws.

Lift the cabinet and fit the keyholes on the bracket over the screws on the wall, then carefully slide the cabinet downwards. Tighten screws to fix the Main Equipment firmly to the wall.

Observe Static Handling Precautions and ensure power is off before removing or replacing any PWBs. Care must be taken when PWBs are inserted or extracted from the main equipment cabinet. The slot in the cabinet is labelled with the PWB Type Number which is also clearly visible on the PWB. Incorrect assembly can cause damage.

Extractor levers are provided at the top and bottom corners of each PWB. Use the extractor levers to apply pressure when inserting PWBs.

**4.2 SYSTEM BOX
CONNECTION
340A -
CONNECTION TO
MAIN
EQUIPMENT**

The Box Connection 340A consists of two 300 box units.

The left hand unit contains the terminal terminations made to five Strips Connection 237A. The right hand unit contains the Line Protection Units. The box is provided with a connectorised cable connection (2m long) to provide connection to the Main Equipment. Hence the Box Conn 340A must be mounted within 2m of the Main Equipment.

The terminal connections can be easily identified from the Labels on Strips Connection 237A.

Exchange Lines to the Main Equipment are connected by the Western Electric style plugs marked Line 1 to 6 on the connectors and Main Equipment. Connect the 3 226 connectors marked A1, A2, and B to the Main Equipment. Both the 226 connectors and line plugs must be locked in place using the locking plate provided. (See fig 2).

An earth link cable is also provided within the cable group which extends the Central Equipment Earth (ETH on Central Equipment) to the line protection units (See Section 4.4).

**4.3 CABLING OF
TERMINALS**

The Emblem Terminals are supplied ready equipped with plug ended line cords.

NOTE These Line plugs are non-standard versions and are only compatible with the purpose designed Linejack units 2/3C.

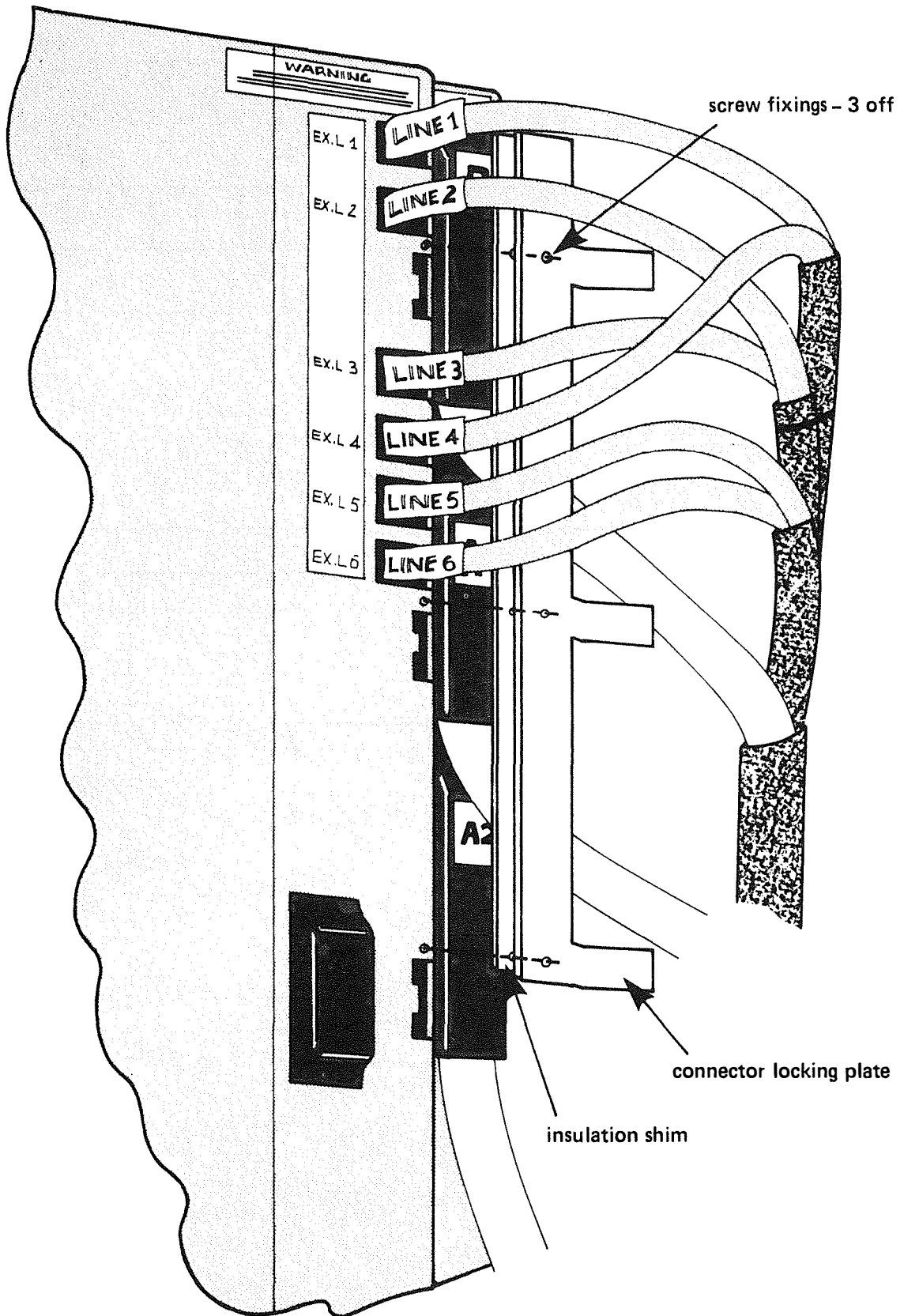
Connection between the box connection 340A and Linejack unit 2/3C must be via devoted wiring (not Building Block Wiring) and connected as shown in figure 3. The terminal cabling resistance should not exceed a 50 Ohm loop from the box connection:-

300 metres 0.5 copper wire
500 metres 0.6 copper wire

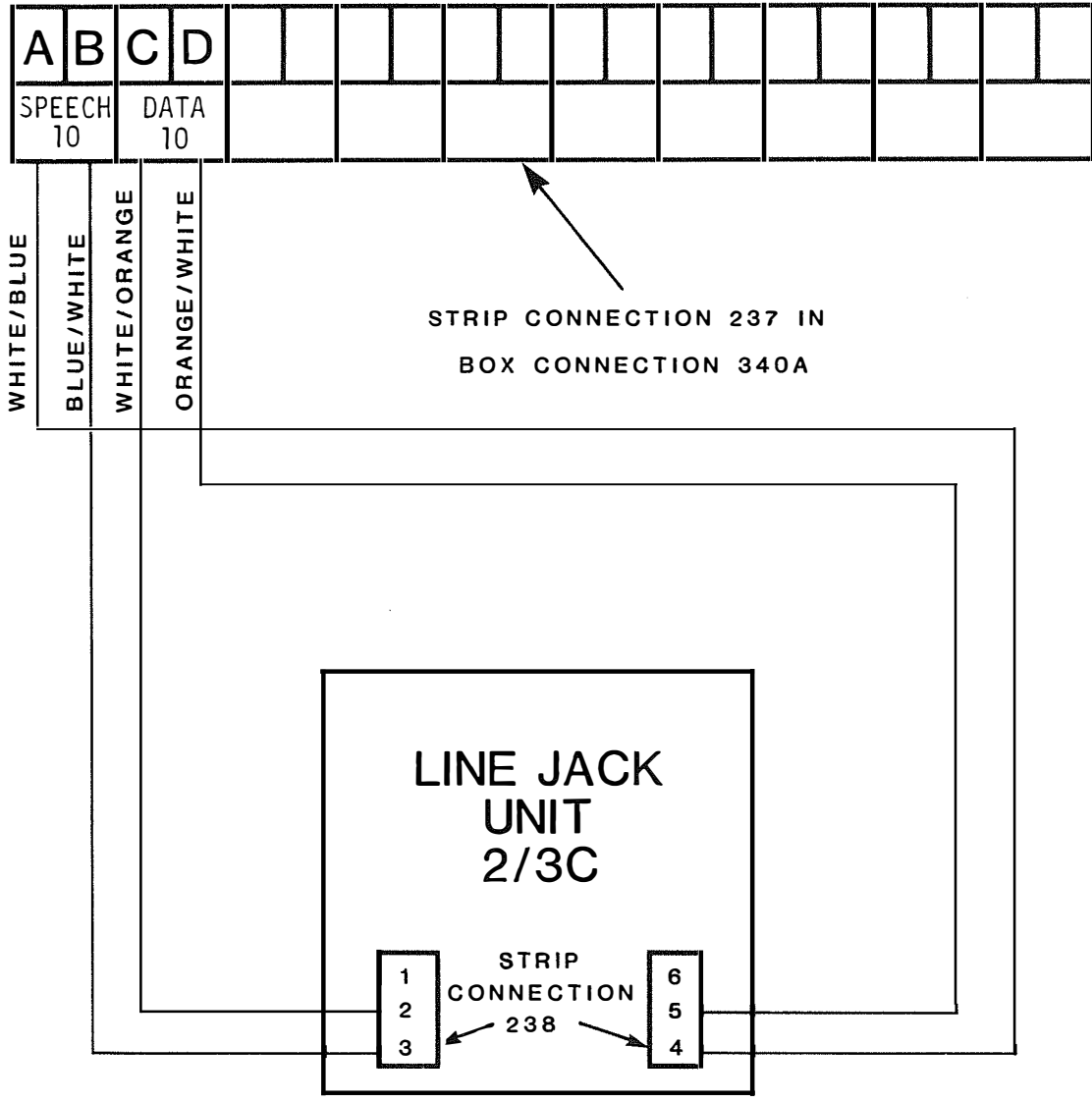
Cable used for this interconnection should be Cable Equipment 2503 F.

NOTE Correct polarity of the wiring through to the terminal is important as all terminals are polarity conscious on both Speech and Data (see fig 3). Finally, the Linejack labels as supplied for EMBLEM should be stuck on to the Linejack front plates. (BRITISH TELECOM S2616)

CONNECTOR LOCKING PLATE ASSEMBLY



EXTENSION CABLING & WIRING



4.4 EARTH CONNECTIONS

It is essential that the 1.5sq.mm earth wire provided within the cable connection is connected to the earth terminal (marked ETH) on the side of the Main Equipment. In addition a hard wired earth connection must be made from the ETH terminal on the Main Equipment to a proven building earth point using a 1.5mm sq insulated earth wire (Earth cable ELP 6491 Green/Yellow 1.5mm sq Item Code 791550). This is in addition to the earth connection provided via the 13 amp socket and power unit. The earth connection should be confirmed using a Tester Line Earth Loop 15ED Item Code 531890 and used in accordance with the instructions provided. Maximum resistance not to exceed 4 Ohms.

When the system is connected to a host PABX, a separate signalling earth must be provided between the building telecommunications earth and the GRD Terminal on the side of the CCU, using 1.5mm sq insulated earth wire.

4.5 EXCHANGE LINE CONNECTIONS TO BOX CONNECTION 340A

To satisfy the current Approval requirements the exchange lines must be connected via a Box Connection 252A. Exchange lines must be provided with loop signalling max loss 10 dB.

The Box Connection 252A provides Strips Connection 237A for termination of exchange lines and is pre-wired to a screw terminal block for connection of the exchange lines to the system. The box should be mounted to provide a maximum cable run of 13m to the Box Connection 340A, hence maximum distance between 252A and Main Equipment must be less than 15m.

Exchange lines from the Box Connection 252A should be terminated on the screw terminals situated on the line side of the Line Protection Units (LPU) in the right hand side of the Box Connection 340A. These screw terminals are labelled with exchange line numbers. See figure 1A for 252A details.

4.6 PW CONNECTIONS

To satisfy the current Approval requirements, private wires must be connected via a different Box Connection 252A from the exchange lines (see figure 1).

The Box Connection 252A provides strips connection 237A for termination of the PWs and is pre-wired to a screw terminal block for connection of the PWs to the Equipment Signalling 27A.

The Equipment Signalling 27A houses the signalling converter and provides a strip connection 237A for termination of the PW's from the box connection 252A and 340A. It also includes a mains to 50V power unit to power the signalling converter and must be mounted within 3m of a 13A mains socket outlet.

**4.7 ATTACHMENT
PORTS FOR
EXTERNAL
PAGING
AMPLIFIERS**

Optional external paging amplifiers should be connected to the approved attachment ports. Two separate ports are available and appear on Strip Conn No 2 in the Box Connection 340A.

Port 1 - terminals B23 and B24
Port 2 - terminals B25 and B26

To satisfy approval requirements, connection is subject to the following conditions:-

- a) Wiring from these terminals must be connected directly to the non fused (equipment) side of an approved fuse disconnection barrier.
 - b) The barrier unit itself shall be mounted in one of the spare positions in the Box Connection 340A.
 - c) The connection shall be extended to the amplifier input terminals from the fused side of the barrier unit using a 2-wire balanced pair.
-

The terminals are available in three basic types:-

S2616S

Standard Terminal without Loudspeech (Monitor).

S2616LS

Standard Terminal with Loudspeech.

S2616E

Executive Terminal with Loudspeech, Power Fail and programming facilities.

A minimum of one Executive Terminal per system is required for programming purposes. A further Approval requirement is that if all six exchange lines are connected an additional Executive Terminal is required for power fail purposes.

Standard Terminals consist of a handset, conventional key pad, Intercom Direct Extension Select (DES) keys, function keys and volume control.

The Standard Terminal is also available with Loudspeech.

The Executive Terminal provides the same features with the inclusion of a character display. When connected as Terminal 10 the Executive Terminal also provides the programming facility.

18 Section 6: Commissioning

6.1 GENERAL CHECKS

Confirm that the plug for socket outlet is correctly fused (3A).

Check Main Equipment power switch is in the OFF position.

Take note of warning labels on the Main Equipment cabinet.

Connect mains plug into power socket (power socket switch in OFF position).

Confirm that the 240V AC and 24V DC mains switch panel fuses are correctly inserted.

Ensure all terminals and exchange lines are correctly terminated.

Check that the A1, A2 and B 226 connectors and line plugs are securely connected, see figure 2, into the correct location on the main equipment cabinet.

Ensure that the 226 connectors and line plug locking plate on the right hand side of the equipment are correctly fitted (See figure 2).

Check that ETH terminations are correctly connected. (Ref 4.4).

NOTE The GRD terminal is for connection of a Signalling Earth, and is only required on systems connected to a host PABX.

Check that the safety cover is fitted over the ETH/GND terminals.

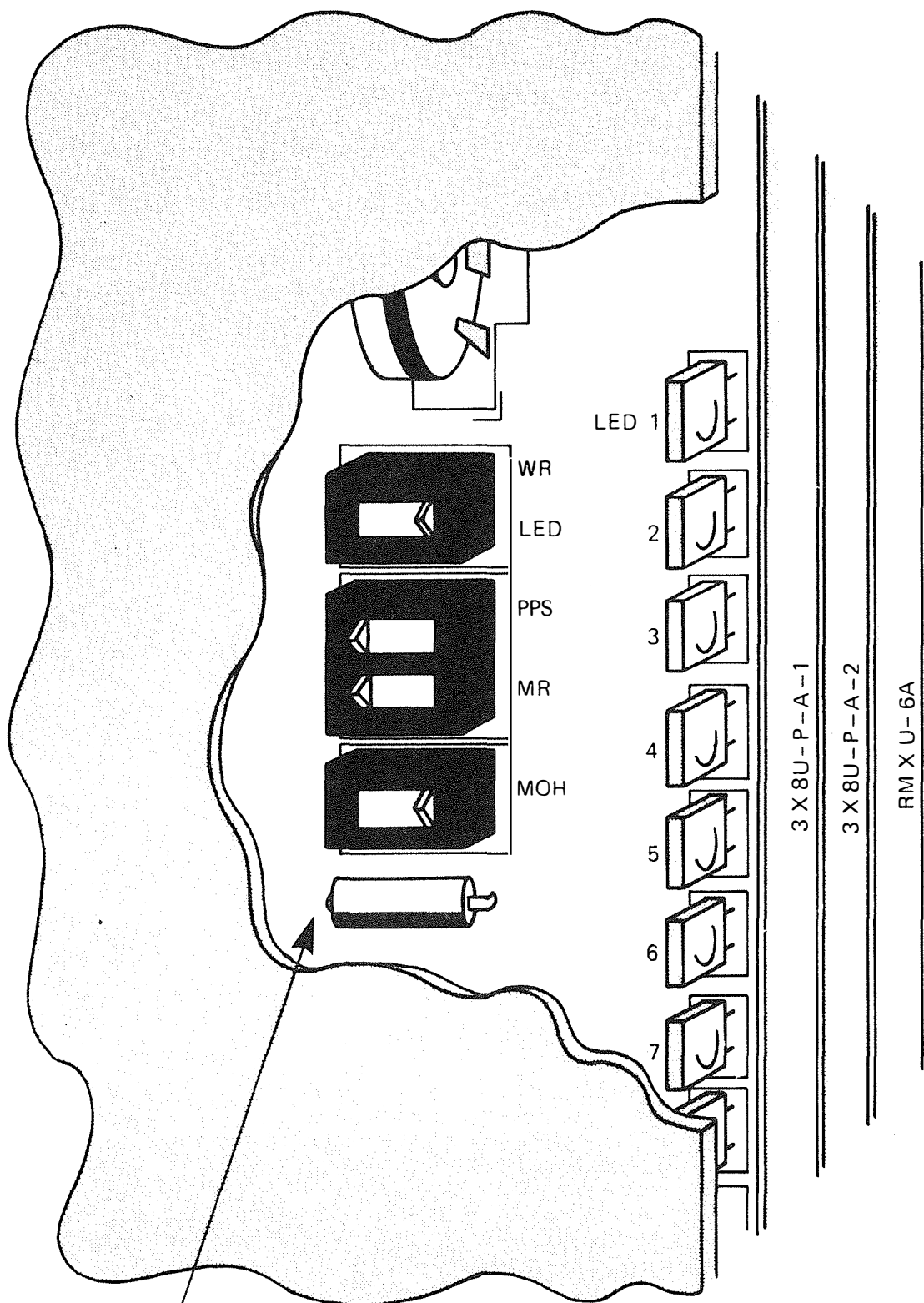
Confirm the box connection wiring is correct as to labels provided in Box Connection 340A for both terminals and exchange lines.

6.2 SWITCH ON PROCEDURE

The following switches appear on the processor board (MCCU6PA). The switches must be set as follows (see figure 4).

SWITCH DESIGNATION	POSITION
PPS	Left position (away from LED)
MR	Left position (away from LED)
MOH	Right hand position (position nearest to LED)
WR	(Initially) left hand position

COMMISSIONING PROGRAMING SWITCHES



processor board MCCU - 6PA

Prior to application of power for the first time following installation, it is necessary to clear the memory of previous system data by setting the WR switch on the MCCU-6PA to the left hand position (away from LED) and following the procedure below:-

Turn on power at main Outlet.

Turn on main supply switch on Main Equipment power unit.

Check that 5v and 24v LEDs on main switch panel are lit.

After approximately 5 seconds from power-on, move the WR switch to right hand position (position nearest LEDs).

NOTE PWBs must only be inserted or removed when power is switched OFF.

Check the diagnostic routine as described overleaf:-

LED Diagnostic Check

LED	STATE	NOTE
CPU OP	Flashing at 5 per second	The Main Equipment routine on MCCU-6PA functions correctly
	Other indication	System Main Equipment fault
LOW BATTERY	No light	The CMOS memory back-up battery voltage is correct
	Steady light	The CMOS memory battery voltage is low
TERM 10 through TERM 25 Marked 1 to 16	No light	Terminal Instrument connections to the Main Equipment faulty, not connected or wrong polarity
	Flashing at 1 per second	Data transmission and reception between Main Equipment and terminals functions correctly
	Flashing at 5 per second	Off-hook or SPKR button "on" status at the associated terminal
	Other indication	Data transmission and reception between Main Equipment and terminal is incorrect

NOTE If data pair are reversed on Standard (Monitor) terminal the SPKR will function, but not the handset.

- 6.3 EXCHANGE LINE STATUS DISPLAY** A diagnostic LED for monitoring exchange line status is located on the 3X8U-PA line interface card. This LED will continuously be illuminated when an Emblem terminal seizes an exchange line or when a terminal answers an exchange line. The LED is not illuminated on incoming ringing. See overleaf for System Default Configuration.

System Default Configuration

On start up the system should default to the following facilities:-

All terminals have Incoming and Outgoing signalling and access to all Exchange Lines.
All terminals are in same trunk queueing group (group 1).
All terminals will be called on night service.
No terminals assigned as Manager/Secretary pairs.
No terminals allowed the "Do Not Disturb facility".
No terminal allowed to Intrude.
Pick-up and Paging Groups set as terminals 10 to 13, 14 to 17 and 18 to 21 for Groups 1, 2 and 3 respectively.
Internal Signalling set as Voice Calling.
No Calls Barred.

- 6.4 SYSTEM PROGRAMMING** The Programming can now be carried out in accordance with the Customer Configuration Information from an Executive Terminal connected as Terminal 10. The programming is described in the Programming Guide.

- 6.5 PROGRAMMING PABX LINES** The following programming information is not given in the customer programming manual. This must be set at the time of installation and will only require amending if the number of PABX lines or type of host PABX is changed. It is important to document all changes.

To program the system, remove the plastic cover and label above the DES keys on terminal 10. The numbers 1 to 16 are moulded in the plastic adjacent to these keys, but are referred to as F1-F16 when programming.

To enter program mode:

Press WR - the recessed button below key F16

To exit program mode:

Press CHECK, F16 and WR

6.5.1 Exchange Line Ports - Loop Dis or Multi Frequency

A number of modern PABXs (and an increasing number of public exchanges) are designed to accept high speed multi-frequency signalling (MF).

The Emblem has the capability of using MF signalling or the older type of loop disconnect.

	PROGRAM		DISPLAY
1	Enter Program Mode	-----	
2	Press F1	-----	06
3	Press LINE key	-----	LINE Number
4	Key 0 for MF or Key 1 for Loop/Dis.	-----	0 = MF 1 = Loop/Dis.
5	Key *		
6	Repeat 3 to 5 for other lines		
7	Key #		
	CHECK		DISPLAY
1	Press CHECK	-----	C
2	Press F1	-----	C06
3	Press LINE	-----	LINE number and loop or MF code
4	Repeat 3 for all lines		
5	Key #		
6	Exit Program Mode		

6.5.3 PABX Recall - Earthed Loop or Timed Break Different PABXs require different conditions to be applied to provide recall. It is essential that the correct conditions are applied by the Emblem to the host system.

	PROGRAM		DISPLAY
1	Enter Program Mode	-----	
2	Press R	-----	02
3	Press LINE key	-----	LINE Number
4	Key 0 for Earthed Loop Key 1 for Timed Break	-----	0 = Earthed Loop 1 = Timed Break
5	Key *		
6	Repeat 3 to 5 for other lines		
7	Key #		
	CHECK		DISPLAY
1	Press CHECK	-----	C
2	Press R	-----	C02
3	Press LINE Number	-----	LINE Number and Earthed Loop or Timed Break code
4	Repeat 3 for other lines		
5	Key #		
6	Exit Program Mode		

6.5.4 Behind PABX Working Data Entry

When the system is piggy-backed onto a parent PABX, it will be necessary to reprogram the relevant exchange line ports for PABX working so that a pause is inserted after the PABX line access code when using the repertory store.

To set lines for PABX working:

- 1 Press F2 ----- 07
- 2 Press LINE key ----- LINE number
- 3 Key "0" for exchange line 0 = exchange line
"1" for PABX line ----- 1 = PABX line
- 4 Key *
- 5 Repeat 2 to 4
for other lines
- 6 Key #

CHECK

- 1 Press CHECK ----- C
- 2 Press F2 ----- C07
- 3 Press LINE key ----- LINE number and
Exchange or PABX
code
- 4 Repeat 3
for other lines
- 5 Key #
- 6 Do not exit programming mode until after the next section

The entry of PABX access code data is shown below. Up to four access codes can be specified. These must be entered into a data field, which has the code 4. Each access code has an associated two digit position number. 01 is the first entry, 04 is the last. To clear an unwanted PABX access code omit step 7.

	PROGRAM		DISPLAY
1	Enter Program Mode	-----	
2	Press F15	-----	20
3	Key field code 4	-----	Field code
4	Key *		
5	Key position number (01 to 04)		Position number
6	Key *		
7	Key PABX Line access code		PABX access code
8	Key *		
9	Repeat 5 to 8 to enter other PABX Line access codes		
10	Key # when complete		

	CHECK		DISPLAY
1	Press CHECK	-----	C
2	Press F15	-----	C20
3	Key field code	-----	Field code
4	Key *		
5	Key position number	-----	Position number
6	Key *		PABX access code
7	Key * to clear the display		
8	Repeat 5 to 7 for other position numbers		
9	Key #		
10	Exit Program Mode		

6.5.5 Preset Pause For Behind PABX Working The default pause is set at 3.2 seconds. To amend the pause time:

- 1 Enter program mode
 - 2 Press TIMER ----- 21
 - 3 Press INTRUDE ----- 7
 - 4 Key number of 0.1 second
pause units required ----- number of pause
(max 200) ----- units
 - 5 Key *
 - 6 Key #
- CHECK
- 1 Press CHECK C
 - 2 Press TIMER
 - 3 Press INTRUDE ----- number of pause
units
 - 4 Key #
 - 5 Exit Program Mode.
-

6.6 SYSTEM DATA ERROR MESSAGES

When the CHECK and F-16 buttons are depressed in sequence, 'P' is displayed at the right-hand side of display. This indicates that the system data has been correctly entered.

If 'C' followed by '--' is displayed, it means that the WR switch on MCCU-6PA has not been set to the ON position (right). Therefore, CHECK and F-16 buttons must be depressed again in sequence after setting the WR switch to the ON position. Should there be any error in system data, an ERROR MESSAGE REF NO is displayed as indicated in the table below:

Error Message
Ref No Display

---	1	PABX access codes are not entered even though PABX lines are assigned
---	2	The minimum pause timer is set to zero even though PABX lines are assigned
---	3	Error data was entered as the call forwarding pair
---	4	DND data is not set to the master terminal for call forwarding
---	5	Data for recall timer is set to zero
---	6	Data for Ring inward timer is set to zero

30 Section 7: Power Fail Operation

Check Power Fail operation before leaving site.

Under power fail conditions exchange lines and terminals should be connected as follows:-

EXCHANGE LINE NO	TERMINAL NO
1	10
2	13
3	16
4	18
5	21
6	24

NOTE Power Fail operation is only available at Executive Terminals.

If loss of power occurs the customer's repertory dial information and any System Programming done at Terminal 10 should still exist assuming the battery on the Memory Battery Board is charged and connected.

EQUIPMENT	DETAILS	ITEM CODE
EMBLEM S2616 Kit 1A	Equipped as 6 + 16 consists of:- 1 x control box and backplane 1 x power supply unit 1 x central processor board, MCCU-6PA 2 x line interface board, 3X8U-6A 1 x matrix extender board, RMXU-6A 1 x line protection board, LPTU-6A 1 x grounding board, MCGU-6PB 1 x memory battery board, RBTU-A 18x "British Telecom S2616" Labels 16x Stick on STD Labels	374618
EMBLEM S2616 DOCUMENTATION PACK 1A	1 x Installation Guide 1 x Programming Guide 3 x User Guides 16x Aide Memoire Cards 1 x Warranty Card 1 x Master List (PXML)	374799
BOX CONNECTION NO 340A	For connecting Emblem S2616 includes harness and line protection units B32/150B.	374790
LINE JACK UNIT 2/3C	For connecting all terminals (Compatible with terminal line cord plugs)	870127
EMBLEM TELE S2616S S2616 STANDARD TERMINAL		374620
EMBLEM TELE S2616LS S2616 STANDARD TERMINAL WITH LOUDSPEECH		374619
EMBLEM TELE S2616E S2616 EXECUTIVE LOUDSPEECH AND POWER FAIL OPERATION		374621
BOX CONNECTION 252A		314405
SOCKET OUTLET NO 103 MAINS PLUG		531513

32 Section 9: What Documentation To Leave With Customer

The documentation available and how it should be dealt with is shown below.

9.1 CUSTOMER DOCUMENTATION

Three BT EMBLEM User Guides - To be left with the customer.

Aide Memoire Cards - One to be left with each terminal. All spares also to be left with the customer.

Master List (PXML) - List of approved boards and units within the system. To be left with the customer.

Programming Guide - To be left with the customer (preferably Terminal 10).

Customer Configuration Information - Leave with the customer. Place inside the back cover of the Programming Guide.

British Telecom Warranty Card - Engineer to complete parts 1 and 3 and hand to customer.

9.2 TO BE TAKEN FROM SITE

Installation Guide - Remove from site.
