ENSIGN CALL CONNECT SYSTEM







ENSIGN CALL CONNECT SYSTEM

- A GUIDE TO INSTALLATION AND MAINTENANCE -

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

CONTENTS

These guide notes have been produced in 4 sections.

- 1. INSTALLATION AND COMMISSIONING
- 2. 4 WIRE ENSIGN EXTENSIONS
- 3. 2 WIRE EXTENSION TELEPHONES
- 4. MAINTENANCE



Produced by BTM Project Team PE1.2. For Training and Education Policy Division BT I/IT 5.1.2.

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SECTION ONE

INSTALLATION AND COMMISSIONING

GENERAL DESCRIPTION

1.1.

Ensign, the layout of which is shown opposite, is a stored-program-controlled electronic switching system, modular in design and offering customers a wide range of features and facilities. It may be installed for use as either a PBX or KEYSYSTEM, and in its basic form has a capacity of 2 external lines and 4 extensions (2 + 4). Add on units can be supplied which allow the system to grow in stages, to give an ultimate capacity of either 6+6 or 2 + 10, so as to suit the customers required mix of extensions and external lines.

The distribution cables are 4 wire, divided into speech and data pairs and are terminated upon either standard 2 wire 87 -- loop disconnect instruments, or, 4 wire Ensign Telephones, Telephones 4/SA 20000 type. The data pair is not connected on 2 wire telephones. Both types of instrument may be mixed on an installation, so as to give additional features selectively at minimum cost.

The Ensign telephone has a 12 digit keypad, 4 fixed function keys, 8 facility or line keys with associated light-emmitting-diode (L.E.D.) indicators, and a sounder volume control. There is also provision for a waiting amplifier or for a headphone socket.

The wall mounted cabinet houses the system power, distribution point, processor, switch and 2 + 4 units all set upon individual printed circuit boards, which are inter-connected by plug-in ribbon cables. The add-on units that are required for extra system capacity are fitted to spare positions within the cabinet.

Each extension connected to the system has the required facilities assigned to it by setting configuration switches, access to which is gained by removing the Ensign label set in the cabinet cover. Further switches enable Ensign to be adapted for use on a variety of P.B.X.'s and main exchanges. Apart from setting the configuration switches, no on or off site programming is required, since all system options are pre-programmed during manufacture.

Ensign is powered directly from a 250 volt 50 Hz mains outlet and fused at 3 amps. In the event of power failure, 2 external lines are switched automatically to either 'power fail' Ensign telephones or to standard 2 wire telephones. The system re-starts automatically when power is restored, a small standby battery having maintained essential user programmed stores during the failure.

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1.2. OUTLINE OF SYSTEM OPTIONS AND FACILITIES

1.2.1. THE 4 SYSTEM OPTIONS

Basically Ensign offers a choice of 4 different system options, together with a wide range of standard and optional facilities and features, so that each installation can be matched to the customers requirements as closely as possible.

The 4 basic system options catered for are:-

1. Automatic Call Distribution

External calls are queued, and then answered in rotation by any extension. Access to the other extensions is by press button or 'dial-up'.

2. Key and Lamp Unit (Order Table Working)

Each extension user has direct access to each external line. Contact with other extensions is by press button or 'dial-up'.

3. System-Operator (Traditional P.B.X.)

One extension is designated an operators position and is used to distribute external calls to the other extensions. Access to external lines is by dialling 9 and to other extensions by press button or 'dial-up'.

4. Executive/Secretarial

Up to 3 executive extensions have exclusive use of an external line, which can be re-directed by press button to a nominated secretarial extension. Access to extensions is by press button or 'dial-up'.

Some combination of the facilities afforded by the above 4 options can be provided if the customer so requests.

On each of these 4 options the following facilities are available to all extension users. They are provided either automatically by the system, or under press-button or dial control.

1.2.2. FACILITIES PROVIDED AUTOMATICALLY BY THE PROCESSOR

Abandoned Call Ringback:

Any external call abandoned inadvertently when in hold, or during the process of transfer, rings back into the system.

Discriminating Ringing:

The system provides distinctive ringing cadances for intercom and external calls.

Hold:

Extension users may hold an established call to make an enquiry call or to initiate a transfer.

"Music" on Hold:

An input is available to the customer for the connection of a previously recorded sound source to any held external line. The content of the sound source is the responsibility of the customer, but is subject to the legal restrictions of copyright etc.

Power Fail I/C Service

Under power fail conditions I/C calls on external lines L1 & L2 are switched to extensions 20 & 21. O/G service is possible if the extension is fitted with a 2-wire telephone or a special power-fail 4-wire telephone.

Transfer Dial Tone:

Barred extensions may be permitted to make outgoing external calls by requesting the system operator to extend dial tone.

1.2.3. FACILITIES AVAILABLE UNDER PRESS-BUTTON OR DIAL CONTROL

Redirect:

A dial-up facility enabling any extension user to redirect or divert their incoming calls to that extension on the system nominated each time the facility is activated.

Keyed Access:

Intercom calls may be made by keying or dialling the required extension number. All intercom calls are private.

Recall Parent Exchange:

The system allows extension users to recall the parent exchange so as to access additional facilities.

Repeat Last Number:

The last out going number dialled from each extension is stored for automatic re-transmission if required by the user.

Repertory Dialling:

Every extension telephone is provided with 10 single-digit dial-up repertory dial stores, each of 18 digit capacity, for user programming of frequently dialled numbers at that extension.

Ring-When-Free:

The system may be requested to set up a follow-on call to an engaged extension when it becomes free.

1.2.4. FACILITY PACKS:

In addition to the above standard facilities, optional facilities have been grouped into a number of dedicated FACILITY PACKS specifically suited to each of the 4 system options. The facility packs are numbered and then applied to each individual extension, so as to provide each extension user with a group of specific facilities. For installation purposes, each facility pack is represented by a diagram such as the one below, and the number of the pack chosen by the customer entered by Sales on the Installation Description Form. The Fitter will then assign the chosen facility pack to each extension by setting the configuration switches.



NOTE:-

Standard 2 wire telephones are assigned the same facility pack numbers, but have 'dial-up' facilities, and no press button facilities except for Hold.

Details of all facility packs together with other system information can be found inside the cabinet cover.

An explanation of all facilities and how they are used, is given in the section of this guide that covers the operating procedures of the extensions.

1.3.1. GENERAL

The practical work necessary to install Ensign is best undertaken in the following stages.

- 1. Choose site for Ensign cabinet and fix base into position.
- 2. Run cabling required for external lines, extensions and signalling earth.
- 3. Terminate cabling to distribution unit inside cabinet.
- 4. Fit and terminate Line Jack Units at extension positions, equip and label telephones.
- 5. Provide any add-on units that are required to give necessary capacity.
- 6. Configure the system to give chosen facilities.
- 7. Connect 250 volt mains supply and internal battery link.
- 8. Commission the System.

WARNING:

DO NOT CONNECT MAINS POWER UNTIL THE SYSTEM IS READY TO BE BROUGHT INTO SERVICE, AND THE RUN/PARK SWITCH IS SET UPWARDS TO THE PARK POSITION.

DO NOT CONNECT AND DISCONNECT RIBBON CABLES, WITH THE POWER SWITCHED ON.





1.3.2. THE ENSIGN CABINET AS SUPPLIED

1

The Ensign cabinet is supplied ready assembled and packed in a carton known as an Ensign C.C.S. Kit No. 1A. As supplied, each kit has a capacity of 2 + 4 and contains the following items, fitted as in the illustrations opposite.

- 1 Ensign Cabinet 1 A complete
- 1 Ensign Processor Unit 1A1/SA20301
- 1 Ensign Power Unit 1A1/SA20302
- 1 Ensign Switch Unit 1A1/SA20303
- 1 -- Ensign 2 + 4 Unit 1A1/SA20304
- 1 Ensign Distribution Unit 1A1/SA20309
- 1 Ensign Cable Connection 1A
- 1 Ensign Cable Connection 2A
- 1 Ensign Cord Connection 1A
- 1 13 amp Plug with 3 amp fuse
- 3 Woodscrews 1.75 x 8 roundhead, and plastic inserts.
- 1 A8836 Label pack.

1.3.3. **SITING THE CABINET**

The position chosen should be such that,

- Sufficient space exists to its right so that the hinged frames holding the printed circuit boards can be opened out. The width of the cabinet will suffice.
- b) The 3 metres of mains cord supplied will reach the socket outlet.
- c) 3 inches of free space exists above and below the cabinet for ventilation purposes.
- d) The cabling to the cabinet can be made as unobtrusive as possible. Entry points are at the top and bottom on the right hand side.
- e) Maintenance upon it, can be carried out safely.
- f) The customer is satisfied with the location.

1.3.4. FIXING CABINET TO THE WALL

Although $1\frac{3}{4}$ x 8 gauge R/H wood screws are provided, the length used may be varied to suit the type of surface to which the cabinet is being fixed. Approximately $\frac{1}{2}$ of screw is required to pass through the Cabinet.

Use the template supplied on the label pack to accurately mark the positions of the 3 fixing holes that are required, and then drill the wall using a $\frac{1}{2}$ " (6mm) masonry bit. Fit Plugs Screw Fixing 1B or 1C as required.



Fig. 5. RIBBON CABLE CONNEXIONS



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Now remove the cabinet cover as follows:-

Remove the Ensign label, by slightly raising its right hand edge and sliding it to the right.

Remove the cover by unscrewing the two captive screws which have been exposed beneath the Ensign label, ease the bottom of cover carefully forward then lift it upwards to disengage the spigots at the top.

Remove the metal bracket that the cover was screwed to, by pressing its sides inwards until it can be pulled forward clear of the base.

To make the task of handling the cabinet easier and safer whilst screwing it to the wall, it is best to remove the two hinged frames.

Referring to the illustrations opposite.

Unlatch and swing outwards the outer frame by pressing to the right the red securing latch. The same latch when pressed to the left, releases the inner frame.

Unplug at A, B, C and D the 4 ribbon cables that connect the distribution and processor boards to the frames.

Remove and discard the split washer which is fitted to one of the hinge pins.

Close the two frames together and lift them off their hinges as a unit. (See illustration on page 19). Store them in a safe place.

Locate the 3 grommeted fixing points (marked X on figure 4) in the cabinet base, and place into them the 3 plastic inserts supplied with the woodscrews.

Screw the base to the wall allowing the rubber grommets to take up any uneveness in the wall surface, without distorting the base. Be careful not to let the screwdriver slip and damage the components.



Fig. 6









Having screwed the cabinet base to the wall, the remaining work necessary upon the cabinet is best left until all cabling has been run and terminated, and the extensions equipped and labelled. Equipping, labelling and operating 4W and 2W extensions is covered in Sections 2 and 3 respectively.

1.3.5. CABLING AND TERMINATING THE INSTALLATION

The Ensign cabinet has a cable channel on the right hand side with access points at the top and bottom. Cables should be run as far as the distribution unit before their sheathing is removed, and their conductors then fed to the insulation displacement connectors in a neat and orderly fashion. Lacing of the conductors is not required. The layout of the distribution unit in the cabinet and the termination of 2W and 4W extensions, external lines and signalling earths are shown opposite.

External Lines

Ensign has been designed to withstand surge voltages on the external lines, but in areas of known high risk or sites with a history of lightning damage, additional protection will be required. T.I. C3 F0052 details the circumstances under which additional protection should be provided.

If protection is required, then it should be provided as follows:--

- a) If the external lines are fed to Ensign from a Building Distribution Point (B.D.P.) the recognised method for the type of B.D.P. provided should be used.
- b) If the external lines are to be fed direct to Ensign, then the external cable should be terminated on a Box Connexion 301A which is equipped with Strips Connexion 237A, Protectors Mounting 5A and Protectors 14A. Cabling between the Box Connexion 301A and the Ensign Cabinet should be Cable Equipment 2000 type. The protective earth connected to the Box Connexion 301A should be installed in accordance with TI. A2 E1006

On the Ensign distribution unit, external lines 1 and 2 terminate to SK13 which is marked L1 and L2. Lines 3 to 6 terminate upon the A and B tags of SK8,7,6 and 5 respectively. SK5 to 8 can be used to terminate extensions if external lines 3 to 6 are not required.

Signalling Earth

A bunched 0.5 mm cable pair should be run from the local signalling earth to SK2 on the distribution unit. The mains protective earth should not be used for this purpose. The remaining terminals of SK1 and SK2 are used to distribute the signalling earth to 2W extensions.

Extensions

The Installation Description Form (see Page 25) will give details of the type of telephone to be provided at each extension. Although both 2 wire and 4 wire extensions are cabled using 4 wire, they are terminated differently on the distribution unit and use different Line Jack Units.

4 Wire Ensign Extensions

The 4 wire extensions should be cabled using Cable Equipment 2501 or 2502. This should be terminated upon tags A.B.C.D. of the appropriate terminal strip on the distribution unit, and upon a Line Jack Unit -/3A at the telephone position (see Fig. 7a). Refer to Section 2 for details of labelling the telephone and the connection of any miscellaneous equipment that is required, such as extension bells and monitor amplifiers.

2 Wire Extensions

The standard 2 wire extensions should be cabled using Cable Equipment 2501 or 2502. This should be terminated upon tags A and B of the appropriate extension terminal strip on the distribution unit, and a signalling earth extended to the telephone by terminating the white-orange conductor to one of the SK1 or SK2 terminals. At the telephone position the cable should be connected to a Line Jack Unit –/1A (See fig. 7b). Refer to Section 3 for details of labelling the telephone, and the provision of any miscellaneous equipment that is required such as extension bells and ON/OFF buttons. All 2 wire telephones are connected as "2 Wire P.B.X. extensions with earth loop recall", although the press-button is used for the 'Hold' facility on Ensign.

Having completed the installation of the extension telephones and external lines, the two hinged frames should be replaced in the cabinet. Lift the two frames as a unit on to their hinge pins, and reconnect the 4 ribbon cables securely. Remember to engage the plug and socket latches.



1.3.6. PROVIDING ADDITIONAL EXTENSION AND EXTERNAL CIRCUIT CAPACITY

Ensign as supplied has a capacity of 2 external lines and 4 extensions (2 + 4). To allow the system capacity to be increased in stages to a maximum of either 6 + 6 or 2 + 10, three add-on units are available.

Ensign 2 + 0 unit	1A1/SA 20306
Ensign 0 + 2 unit	1A1/SA 20305
Ensign 1 + 1 unit	1A1/SA 20308

The add-on units are mounted upon the outer hinged frame, and connected to ready provided ribbon cables. (See illustrations below and opposite).



CONTROL CABINET SHOWING FRAME 2A EQUIPPED WITH THREE ADD-ON UNITS It is important that each unit is fitted to its correct position on the frame, since the ribbon cables allocated for use at each position, are permanently associated with the system configuration switches, and hence determine the line and/or extension numbers that will be brought into service.



The following layouts must not be varied, except in the conditions stated by the notes. The rule is that external circuits grow from the top downwards, and extensions from the bottom upwards.

2 + 0	2 + 0	2 + 0	1 + 1	0 + 2
E/L 3 and 4	E/L 3 and 4	E/L 3 and 4	E/L 3 Extn. 28	Extns. 28 and 29
2 + 0	1 + 1	0 + 2	0 + 2	0 + 2
E/L 5 and 6	E/L 5 Extn. 26	Extns. 26 and 27	Extns. 26 and 27	Extns. 26 and 27
0 + 2				
Extns. 24 and 25				
system	system	system	system	system
capacity	capacity	capacity	capacity	capacity
6 + 6	5 + 7	4 + 8	3 + 9	2 + 10

NOTES

THE ONLY VARIATION PERMITTED IS THE OMISSION OF ONE OR MORE UNITS IN ACCORDANCE WITH THE CONDITIONS BELOW.

- UP TO TWO EXCHANGE LINE UNITS CAN BE FITTED, AND MUST GROW FROM THE TOP DOWNWARDS.
- EXTENSION UNITS MUST GROW FROM THE BOTTOM UP-UPWARDS.
- ONLY ONE 1 + 1 UNIT CAN BE FITTED. IT MUST BE FITTED IN THE TOP POSITION IF NO EXCHANGE LINE UNIT IS FITTED, OTHERWISE IT MUST BE FITTED IN THE MIDDLE POSITION WITH THE EXCHANGE LINE UNIT IN THE TOP POSITION.
- AN EXCHANGE LINE UNIT OR 1 + 1 UNIT MUST NOT BE FITTED IN THE LOWER POSITION.

If a 1 + 1 unit is fitted and one or more of the frame positions is left spare, then an interruption to the extension numbering sequence will occur as follows:-



Fitting the Add-On Units

When handling the units, keep fingers away from components.

Each unit is clipped into the frame with the 4 base posts securely located in each corner hole, such that the 3 clips engage over the printed circuit board.

If add-on units are to be fitted in the lower two positions then the switch unit must be removed first. The switch unit is held on the frame by a screw in each side.

When an add-on unit is fitted to the top frame position, then the white 'dummy' unit upon which the cables are parked should be removed, and given to the customer along with the spare telephone labels to keep safe.



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SWITCH PANEL AND CONFIGURATION SWITCHES

*These ports can be used for both exchange lines and extensions.

1.4. SYSTEM CONFIGURATION AND INSTALLATION DESCRIPTION FORM A37

1.4.1. GENERAL

To assign the required facilities to extensions, and to enable Ensign to work with the signals provided by the parent exchange, 4 switches associated with each extension and external line have to be 'set' or 'configured'. Similarly a SYSTEM switch has to be configured so that the control unit knows how many external circuits have been connected to the system, and what type of ringing is used on them.

The complete switch panel is illustrated opposite, note: -

- 1. That there are 12 'ports' or 'inputs' and that each group of 8 switches covers 2 of these, i.e., 4 switches to each port.
- 2. That port numbers 7, 8, 9, 10, can be either extensions or external circuits; the use will depend upon the type of add-on units provided. They cannot be both.
- 3. That each of the 4 switches on a port can have 1 of 2 positions, and thus a variety of combinations is possible, in fact 16.
- The RUN/PARK switch which is used to take the system into and out of service.
- The red Light Emitting Diode (L.E.D.) which provides information about the working state of the system by the visual signals it gives. For example, system running and OK – 4 flashes/sec., system processor fault – LONG ON, SHORT OFF.

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			SE	CTION	1 C	USTON	IER DETAI	LS				
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NAME						С	USTOMER	'S CONT	ГАСТ			
ADDRES	SS											
						т	ELEPHONE	E NUMB	ER			
						R	EADY FOF	SERVI	ICE DA	ГЕ		
MAINTE	ELEPHONE	NUMBER				S	ALESOFFI	CER			•	
(*Delete a	s appropriate)					D	UTY REF 8	& TELE	NO.			
			S	ECTIO	N 2	SYSTE	M DETAILS	5				
	A. TO BE C	OMPLETE	DBY	SALES	DIV	/ISION		B. Fl	TO BE			ON ON
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3 NC	COTES: O BE COMP EXCHANG and/or PBX EX NUMBE (2) DI - 246 DI - 246 DI - 246	1. Exchan conditio 2. When m EITHEI SEC LETED BY E LINE TENSION RS 8090 8091 8097	ge line ons – hore th R all n CTION SALE OUTC DIA GR IN* (3)	AL 9 OUP	PBX PBX PBX PBX PBX PBX PBX PBX	extension rketing X is invo ng OR is NAL LI N SS COMING SSWER CHANGE ROUP	3+7 ons can be n Product Har olved, the rin all auto-ring INE PARAM B. TO B TRUNK MF* (7) (7)	nixed Of ndbook. nging pro- ing. ME TE RS BE COM C SIGNAL DISCO	NLY und ogramme PLETER DIVIS LLING	der spec e must h D BY EI ION EAI REC. ()	ified be NGINE RECA RTH ALL*	ERING LL BREAK (10)



The information necessary to configure the system is given on an Installation Description Form A37, an example of which is shown opposite.

1.4.2. CONFIGURATION OF THE "SYSTEM" SWITCH

Section 2 of Form A37

Outlines the system details to enable us to configure the SYSTEM SWITCH. In the example shown there are 3 exchange lines which will of course be automatic ringing. If Ensign was to be connected to a PBX, then the type of PBX would be shown, so that we could determine whether to configure for automatic or manual ringing on the external circuits. All lines connected to Ensign must use the same type of signalling, either all automatic or all manual



1.4.3. CONFIGURATION OF THE "LINE" SWITCHES

Section 3 of Form A37

Outlines the 4 external line parameters that need to be known in order to configure the LINE SWITCHES.

Outgoing Line Access in Dial 9 Group

Lines placed in the group are available, when free, to extensions who dial 9. Lines left out of the group are available only to extensions with dedicated Line Keys.

Incoming Line Access In Answer Exch. Group

Calls on lines placed in the answer exch.group, are queued and answered in rotation by extensions with an answer exch. key. Lines not in the group have to be answered by dedicated keys.

Loop-disconnect /MF4

By selecting the appropriate switch setting Ensign will work with parent exchanges that use either loop-disconnect or MF4 signalling.

Recall

The appropriate setting allows Ensign to work to systems using either D.C. break or earth recall.

NOTE

If the external line does not have a recall facility e.g. normal exchange lines, then the switch should be set to the earth recall position.

The switch positions to select the parameters required is represented by the grid shown on the illustration below. Each group of 4 switches associated with the line is read from left to right.

SWITCH 1	SWITCH 2	SWITCH 3	SWITCH 4
MF4	D.C. BREAK	IN DIAL 9 GROUP	IN ANS.EXCH.GROUP
LOOP/DIS.	EARTH RCL.	OUT DIAL 9 GROUP	OUT ANS.EXCH.GROUP

For example the switch setting shown below would give the following line parameters

1	2	3	4	
		0		
0	0		0	

1. Provide for loop-dis dialling

2. Provide for earth recall

3. Put the line in the dial 9 group

4. Place the line out of the Answer Exch. Group.

For the external line parameters shown on the example installation description form, the line switches would be set as follows,



The permitted mix of external circuits, i.e. exchange and PBX lines is shown opposite.

PERMITTED MIX OF EXTERNAL CIRCUITS

a. Exchange Lines and PBX Extensions

Exchange lines and PBX entensions can be mixed ONLY IF ALL FOUR of the following conditions are met:

- 1 Facility Packs 5, 6 or 7 must be allocated to every extension.
- 2 An Ensign terminal must be fitted on each extension.
- 3 The ringing programme of the PBX must be "Automatic".
- 4 Either all the exchange lines or all the PBX extensions must be "out of Dial 9 group". (This is because both types of circuit terminate on identical equipment in the Control Unit, and if both could be accessed via Level 9 the user would not be able to tell which type had been seized.)

b. Extensions from more than one PBX

Extensions from more than one PBX can be provided ONLY IF the ringing programmes are **either** all Automatic, **or** all Manual.

If extensions from more than one PBX are to be provided on a system together with exchange lines, the PBX extension ringing programme can only be Automatic, in order to meet Condition 3 above.





1.4.4. THE EXTENSION TELEPHONE... WHAT TO FIT

Sections 4 & 5 of the Installation description form (shown opposite) provide the information necessary for the configuration of the extension Port Switches, and gives details of the apparatus that should be connected to each extension No.

Section 4 of Form A37

- Col. 1: Note that extensions 20 & 21 are connected to external lines 1 and 2 respectively under power fail conditions.
- Col. 2: In order to make outgoing calls underpower fail conditions, these two extensions must be fitted with either standard 87.. instruments or special power fail Ensign telephones, Telephones –/SA 20014 which use 10 pps signalling. A tick placed in the box indicates that an Ensign Telephone –/SA 20014 is required.
- **Col. 3:** The number denotes the colour required for each Ensign extension. The colour code box is on the right.
- Cols. Shows the type of colour of each 2W extension that is required. 4&5
- **Col. 6:** This column shows the number of the facility pack that the customer has chosen for each extension, and as will be seen on the following pages, is sufficient information to allow us to configure the extension switches, and fit the correct telephone labels.

Section 5 of Form A37

This section gives details of any subsidiary apparatus or attachments that have to be fitted to the external lines or extensions, and any other relevant information.

Example

On the installation description form opposite Extension 23 will be fitted with:-

A Light Grey/Orange Ensign Telephone with monitor.

1 ACD	2 ACD	3 ACD	5.1 K&L	5.2 K&L	5.3 K&L
T 20 T 21 T 22 T 23 3 PARTY ANS EXCH	AS 1 BUT WITH CALL BARRING	AS 1 BUT WITH INTER- NATIONAL CALL BARRING	L 1 T 20 T 21 T 22 T 23 T 24	L 1 L 2 T 20 T 21 T 22 T 23	L 1 L 2 L 3 T 20 T 2 1 T 2 2

5.4 K&L	5.5 K&L	5.6 K&L	6 K&L	7 K&L	B OPERATOR
					0000
L 1 L 2 L 3 L 4 T 20 T 2 1	L 1 L 2 L 3 L 4 L 5 T 20	L 1 L 2 L 3 L 4 L 5 L 6	AS 5.1 to 5.6 BUT WITH CALL BARRING	AS 5.1 to 5.6 BUT WITH INTER- NATIONAL BARRING	T21 T22 T23 NIGHT SV REVERTED ANS EXCH





ACD =Automatic Call DistributionK & L=Key and LampExec. =ExecutiveSec. =SecretarialOOS =Out of Service

Fig. 13 Facility Packs

1.4.5. CONFIGURATION OF THE EXTENSION SWITCHES

The diagrams opposite provide a pictorial representation of each of the facility packs that is available, and the switch setting necessary to provide them.

For example,

To provide facility pack No.1 which is used for automatic call distribution (ACD), the 4 extension port switches would be set as follows.



and the facilities given to the 6 right hand buttons on an Ensign telephone would be



NOTE

The Ensign telephone would be fitted with label No. 1 from the label pack. Taking the Installation Description Form shown on page 26 and 30 as a typical example, then the configuration switches would be set as shown in the illustration below:-



Note that the spare positions are configured as Facility Pack 0.

A guide to all switch settings will be found inside the cabinet cover.

Installation Check

Check that the following work is complete and then bring the installation into service following the commissioning instructions.

- 1. Ensign cabinet fitted complete with any add-on units that are required (Page 19).
- 2. The configuration switches have been set in accordance with the installation description form (Pages 27 and 33).
- 3. The exchange lines, earth and extensions have been cabled and terminated upon the cabinet distribution board and line jack units. (Pages 17 and 18).
- 4. The extension telephones have been equipped and correctly labelled. (Page 31).

COMMISSIONING THE INSTALLATION

1.5.1. **STAGE 1.**

A battery is provided to maintain information in the repertory dialling stores in the event of mains failure, but it is usually disconnected whilst Ensign is in store so that it does not become discharged.

To reconnect:

Locate the LKF link on the processor board (towards bottom centre) and place the U Link which has been placed on one of its pins across them both.

1.5.2. **STAGE 2**.

Check that the 250V mains lead is clipped into position down the left hand side of the cabinet and that the rubber grommet it passes through at the bottom of the base is in position. Cut the free end of the mains lead to the required length and connect a mains plug fitted with a 3 amp fuse. DO NOT PLUG IN AT THIS STAGE.



Fig. 14


Fig. 15 Part of Installation Record Card

1.5.3. **STAGE 3**

Check that all ribbon cables have been plugged in securely and that their latches are in position.

1.5.4. STAGE 4

Close and latch the 2 hinged frames, and then fit the metal cover retaining bracket. Record details of the installation on Card 9050 (see illustration opposite), and then place the card inside the cover before fitting it into position. Leave the Ensign label off until commissioning is complete.

1.5.5. STAGE 5

Set the RUN/PARK switch upwards to the PARK position.

Plug-in and switch on.

There will be a short delay whilst the system powers up, on the successful completion of which, the LED will glow continuously. The system is now fully prepared for service but is PARKED, preventing any calls from being made.

If the LED remains off, check the mains connections. If the LED flashes, the switch may not be in the PARK position; switch off mains supply reset RUN/PARK switch and try again. If still unsuccessful refer to maintenance section of this book.

1.5.6. STAGE 6

To bring the system into service from Stage 5, set the RUN/PARK switch to the RUN position.

There will be a short delay whilst the system 'reads' the configuration switches and performs a test routine (up to 30 seconds) then the LED changes and flashes twice a second.

The system is now running and ready for service.

The extensions should be tested as detailed in Stage 7 overleaf.

NOTE:--

If the flash rate 'SHORT-ON', 'LONG-OFF' appears there is a configuration error. Check configuration switch settings, and that the correct type of add-on units have been fitted.

If the flash rate 'LONG-ON, SHORT-OFF' appears the processor test routine has detected a fault. Switch off the power and make another attempt repeating Stage 5. If still unsuccessful refer to the maintenance instructions.

1.5.7. STAGE 7

Exhaustive testing of all Ensigns facilities is unnecessary since the system monitors and tests itself.

The following tests should be made at each extension instrument referring if necessary to the operating procedures for the instruments given in Sections 2 and 3.

At each extension: -

- a) Listen for system dial tone, a continuous high pitched two tone sound.
- b) Test the Keypad or dial by keying the extension number and listening for engaged tone.
- c) Check bell by obtaining ring back.
- d) Press the CALL/CLEAR or MONITOR button and check that its LED glows.
- e) Check that the correct label has been fitted by pressing each exchange line button in turn and listening for main exchange dial tone. If any discrepancies occur, check whether the configuration switch settings and instrument labels are correct. If changes have to be made to the configuration switch settings then the system must first be taken out of service as follows:

Set RUN/PARK switch to PARK. The LED will glow continuously if calls are in progress and go out when they all clear. Calls can no longer be made until the system is brought back into service by setting the RUN/PARK switch to RUN.

.

SECTION TWO THE 4-WIRE ENSIGN EXTENSION (Tele 4/SA 20012)

2.1 GENERAL

The Ensign terminal illustrated below, is identical to the Herald Standard (HS) terminal. The mode of use is also identical, with one exception – the "hatch". ($\neq \neq$) and "star" (*) buttons have no function at present.



Fig. 16



R:Recall

- T: Transmit (e.g. stored numbers)
- P: Program (used when storing information)
- H: Hold (for enquiry or transfer)

The main features of the Ensign telephone are,

A Keypad

Four **Fixed function buttons** (R, T, P and H), which have the same function on every Ensign terminal

Eight variable function buttons: 2 under the keypad, and another 6 in a column to the right, each with a lamp and a label. Each button can be programmed to give access to the various facilities of Ensign, and their precise function on the terminal depends on the facilities which have been provided.

An optional **loudspeaker** (located under the handset) for use with the Direct Voice Calling and Monitor facilities described later.

An optional **socket** (located beneath the loudspeaker grill) for a headset.

A volume control at the back of the terminal, near the handset rest.

2.2 SIGNALLING LAMPS AND TONES

Lamp Signals

Beside each variable function button is a lamp which can give 3 different signals:-

Calling signal (a steady "on-off" flashing")

Engaged signal (a continuous glow)

Hold signal (a flash repeated twice a second)

The lamp may also glow steadily when an optional facility is being used.

Tones

The following tones will be heard on Ensign.

Ensign dial tone	a continuous high-pitched two-tone sound.
Exchange dial tone) Exchange ring tone)	The familiar exchange 'ring' and 'dial' tones, will be heard when making external calls.
Internal ring tone	a repeated "burr" (on calls to other extensions).
Engaged tone	a repeated single note.
Number Unobtainable tone	a continous high-pitched monotone.

2.3.

TONE SOUNDER

The tone sounder provides two distinctive ringing signals: -

External ringing signal	burst of 2 rings separated by short pauses (on calls from the public exchange, or a PBX).
Internal ringing signal	long single rings separated by long pauses (on calls from other extensions).

If a call is received from another extension, whilst an external call is ringing in, the external ringing signal will change to the internal ringing signal i.e., internal calls take precedence.

Sounder Volume and ON-OFF Controls

The volume can be adjusted to soft, medium and loud, by moving a 3-position knurled wheel at the back of the instrument just beneath the handset rest.

To increase volume: rotate wheel in clockwise direction.

To lower volume: rotate wheel in anti-clockwise direction.

Adjusting the volume control simultaneously alters the volume of the loudspeaker used with Direct Voice Calling and Monitoring, where these options have been fitted.

When the facility button beneath the 'hatch' button has been labelled SOUNDER' it can be used to cut off the external ringing signal. The lamp signals associated with 'exchange' and 'answer exchange' buttons will continue to be given, as will the ringing signal on other calls. A lamp beside the sounder On/Off button glows, when it is in use.

2.4. TELEPHONE LABELS

Each Ensign installation is supplied with a pack of labels sufficient for a system of maximum size. All unused labels should be left with the customer as spares, in case of future re-configuration of the system.

The large labels which are fitted to the right of the 6 programable function buttons are numbered to show the facility pack to which they relate. It is important that the labe used on the terminal is the same as the facility pack no. allocated to it. The external line and extension numbers assigned to the relevant press buttons by each facility pack, are indicated on the tear off portion to the right of each label. Label entries should be typed in by the customer or entered neatly by installation staff if so requested.

Removing the Label Protector above the Keypad

Using the thumb of your left hand, push down on right hand side of label protector and slide slightly into the case. Label protector can now be removed. Reverse the procedure to replace Fit the label that gives the correct extension number adding the principal exchange line number if so requested.

Removing Label Protector between 2 bottom facility buttons

This label is a little difficult to remove until you get the 'knack'. Do not use a screwdriver otherwise you may slip and damage the case.

Apply pressure to one edge of the label protector using the end of a pencil, in order to bow the label protector upwards. The label protector may then be removed by pulling upwards with the fingers. Fit the correct label in accordance with the following instructions, then replace label protector in position and 'snap' fit.



PUSH DOWN



To compliment the chosen system option an Ensign extension can be equipped with either an Amplifier 13A, or, a Jack Unit 4A (headset jack) as an additional feature. BOTH ITEMS CANNOT BE PROVIDED ON THE SAME EXTENSION. The bottom 2 facility buttons should be labelled as follows:—



Removing the label protector for the 6 right-hand facility buttons

Apply downward pressure at a point approx. 5mm (%'') from the bottom of the label protector as though trying to slide it into the case. This will cause the top edge to spring free enabling it to be removed. Fit the label corresponding in number to the facility pack used.

To replace the protector: place the larger bottom tongue into position, press the top of the protector downwards and towards the front of the telephone and it will snap into position.

2.5 **PROVIDING MONITOR FACILITIES**

When fitted with an Amplifier and Loudspeaker 13A, Ensign extensions are able to:-

- 1. Receive 'direct-voice-calling' i.e. spoken messages, from extensions which have a facility button assigned SPEAK, without lifting the handset.
- 2. Make calls without lifting the handset. The loudspeaker is used to MONITOR the progress of an outgoing call and to amplify incoming speech.

The Amplifier 13A is screwed into the base of the telephone and the loudspeaker fixed into the top beneath the grill.

To remove the telephone base

Slacken the two captive screws until the base can be lifted clear of the retaining tongues. DO NOT remove the plug ended sounder and cord connections.



Fitting the Amplifier Printed Cct. Board (PCB)

Screw the Amp 13A P.C.B. into position in the base using the 3 self-tapping screws and washers provided.

Plug the lead from the Amp 13A into the TERMINAL + AMP position on the TELEPHONE P.C.B. A printed silver label in the base indicates the relative positions of the various plugs.



Fitting the Loudspeaker

Using a screwdriver instrument No. 9 remove the 4 screws and washers that secure the telephone PCB to the case. Carefully lift the PCB clear, trying not to touch any components on the board.

Determine which type of loudspeaker retaining spring has been supplied with the kit and fit the loudspeaker over the grill as shown below.





Replace the telephone PCB, taking care not to trap the loudspeaker leads, between PCB and telephone case.

Connect the loudspeaker leads to pins PLA on the Amplifier 13A PCB. Refit the base to the telephone, not forgetting the plastic blank in the side, and it is ready for use.

Refer to operating section of the guide (Page 66) for method of use and facilities.













Fig. 19. End view showing new position of tags.

2.6. PROVIDING A HEADSET FACILITY

An Ensign telephone may be equipped with a Jack Unit 4A, enabling a headset to be used in lieu of the handset. When provided, the bottom left hand facility button is designated CALL/CLEAR and performs the function of the gravity springs. Inserting the headset plug into the socket disconnects the handset and so it is not possible for two people to "listen in".

Fitting Jack Unit 4A

Check whether the rectifier tags are in an upright position on the Jack Unit 4A P.C.B., and if they are then it is necessary to modify these as shown in the illustrations opposite.

Screw the Jack Unit 4A P.C.B. into the telephone base, using the same method as described for the Amplifier P.C.B. on the previous pages.

Remove using fingers, the round knockout on the left hand side of the telephone case, and fit the jack to the keyed hole using 1 washer either side of the case. Tape blank inside case.

Referring to the Silver label inside the telephone case; identify the 4 way speech pair plug on the telephone P.C.B., remove and plug it into position PLA on the Jack Unit 4A P.C.B. The plug is marked 1 to ensure correct alignment.

Plug the leads from the jack into position PLB on the Jack Unit 4A P.C.B. It will only fit one way round.

Plug the leads from the Jack Unit 4A P.C.B. into position on the telephone P.C.B. **Make certain it engages with all pins**, do not force, it will only engage one way round.

Replace the base on the telephone and it is ready for use. The user instructions, Section 2, describe the use of the headset facility.

2.7 SUBSIDIARY EQUIPMENT

2.7.1 EXTENSION BELLS

One high impedance bell (Bell Set 50D or Bell 80D) may be associated with an Ensign extension. This arrangement may be repeated as often as required, subject to the overriding limitation of the number of 'bells' on the system, i.e. approximately 10 bells or tone callers may be rung simultaneously.

The wiring of an extension bell is as follows:-



NOTE 1.

The high impedance Bell Set 50D contains a capacitor and is suitable for connecting directly across the A and B wires of the line. The high impedance external Bell 80D however, contains no capacitor and must be modified as follows.

A capacitor 8017B (2.2 microfarad), or any 250v working non-electrolytic capacitor of this value, must be connected in series with the bell coils.

2.7.2. EXTENSION PLANS

It is not possible to connect any type of plan extension to a 4W Ensign extension.

Additional line jack units may be provided on an extension, but only one instrument can be used.

2.7.3. ADD-ON EQUIPMENT

A wide range of equipment can be used in conjunction with Ensign terminals and the appropriate N series diagrams or guide notes should be consulted.

2.8. FACILITIES AND OPERATING THE 4 WIRE ENSIGN TELEPHONE

2.8.1. ANSWERING EXTERNAL CALLS

Incoming calls on exchange lines and extensions from PBXs can be answered in 4 different ways, depending on the functions that have been given to the buttons on the terminal.

Method 1 Using the handset only

Each incoming line is connected to a LINE xx button with an associated lamp

When an incoming call is received, the extension will ring and the LINE xx lamp will flash.

To answer a call:

1 Lift the handset

The sounder will stop, the lamp will change to a steady glow, and you will be connected to the incoming caller.

At the end of a call:

Replace the handset (the lamp goes out).

Method 2 Using the handset and a programmed press-button

Each incoming line is connected to a LINE xx button with an associated lamp.

When an incoming call is received, the extension will ring and the LINE xx lamp will flash.

If you know that the line is connected to other extensions on the Ensign system, you can choose not to answer the call. When someone else answers, the ringing signal will stop, and the flashing light will change to a steady glow.

If more than one lamp is flashing, you can choose which call to answer first.

To answer a call:

1	Lift the handset (the sounder will stop).
2	Listen for Ensign dial tone.
3	Press the button beside the flashing light. (The lamp will change to a steady glow, and you will be connected to the incoming caller.)

At the end of a call:

Replace the handset (the lamp goes out).

Method 3 Using the Handset and an ANSWER EXCHANGE button

When an incoming call is received, the extension will ring and the lamp by the ANSWER EXCHANGE button will flash.

If the line is connected to other extensions on the Ensign system, you can choose to ignore the call. When someone else answers, the ringing signal will stop and the lamp will go out (unless there is more than one call waiting to be answered).

To answer a call:

1 Lift the handset. (The sounder will stop)

2 Listen for Ensign dial tone.

(At this stage the incoming call can be ignored and an outgoing exchange or internal call made).

Press the ANSWER EXCHANGE button.

The lamp will stop flashing, and you will be connected to the incoming call. (If there is more than one waiting call, you will be connected to the one which has been waiting the longest, and the lamp will continue to flash.)

To clear a call:

3

Replace the handset.

To clear a current call and answer the next call in the queue:

(A waiting call will be indicated by the flashing of the ANSWER EXCHANGE lamp)

Press the **ANSWER EXCHANGE** button.

Method 4 Using a headset and CALL/CLEAR button

This method is described on Page 69

2.8.2. ANSWERING INTERNAL CALLS

When an internal call is received the internal ringing signal will be heard, and if the extension has a named intercom button for the calling extension, the associated lamp will flash.

When the handset is lifted the lamp (if there is one) will glow steadily and you can speak directly to the caller. At the end of the call, replacing the handset will cause the lamp to go out.

2.8.3. MAKING EXTERNAL CALLS

Calls can be made on selected external lines by means of [LINE xx] buttons and /or on the first free line by keying '9', depending upon the facilities available at the terminal.

TO MAKE A CALL, using a <u>LINE xx</u> button: Note, the <u>LINE xx</u> button may give access to an exchange line, a PABX line or a PMBX Operator.

- 1 Lift the handset and listen for Ensign dial tone.
- 2 Press the desired LINE xx button, after checking that the associated lamp is out, (If the lamp is on, this means that the line is being used.) The lamp will then light.
- 3 Key the number wanted, or ask operator on PMBX for number required.

TO MAKE A CALL, by keying '9':

- 1 Lift the handset and listen for Ensign dial tone.
- 2 Key '9' on the keypad, wait for external dial tone, or PMBX operator to answer.

The R button functions as a recall button for calls via PABX's or PMBX's.

NOTE: If the extension is barred from making certain types of exchange calls you will hear the number unobtainable tone during the keying sequence. Exchange calls to Emergency Services (999) will not be barred.

2.8.4. MAKING INTERNAL CALLS

Internal calls may be made by 'dialling' or by means of the named intercom button if there is one for the extension required. The lamp beside the button will be lit if the extension is already engaged.

2.8.5. CALLING THE ENSIGN SYSTEM OPERATOR (Facility pack 8)

If an Ensign terminal has been designated to act as a system operator's position for connecting calls and giving assistance, etc. then :-

TO CALL THE ENSIGN SYSTEM OPERATOR:-

- 1 Lift the handset and listen for Ensign dial tone.
- 2 Key "O" on the keypad as an alternative to keying the terminal number.

Should the system not have an operator's position, you will hear number unobtainable tone on keying "0".

2.8.6. **RING WHEN FREE**

If the engaged tone is heard when another Ensign extension is called you can programme Ensign to call the extension again when it becomes free.

TO INITIATE A RING-WHEN-FREE CALL

- 1 On hearing engaged tone, key "2" on the keypad
- 2 Listen for Ensign dial tone this shows that the instruction has been accepted. (If the facility is already in use, you will hear number unobtainable tone and will have to call the extension again later in the usual way.)
- 3 Replace the handset.

When the called extension is free, your extension will ring with the internal call cadence. On lifting the handset, ringing tone will be heard as the required extension is called.

If the called extension becomes re-engaged before the ring-when-free call is effected, the ringing tone will stop. In this case, replace the handset – Ensign will try again when both parties are free.

TO CANCEL A RING-WHEN-FREE CALL

- 1 Lift the handset and listen for Ensign dial tone.
- 2 Key "1"
- 3 Listen for Ensign dial tone this shows that the instruction has been accepted.

A ring-when-free call is automatically cancelled if:-

- a. the other extension successfully calls you;
- b. you do not answer your extension on a ring-when-free call within one minute of the start of ringing.

2.8.7. HOLD FOR ENQUIRY

One incoming or outgoing call may be 'held' at each extension whilst making an enquiry call to another extension, or over an exchange line. A call can also be 'held' in order to answer another external call.

To hold a call:

1 Press H , and listen for Ensign dial tone.

The original call is now 'held' and you can make an internal or exchange call, or answer other incoming calls, as you wish, by following the normal operating procedure. If the held call was answered by pressing a LINE xx button, the lamp by the button will flash slowly at the held-call cadence.

To return to the held call:

- a. If you made an internal enquiry call.
 - 1 Press H ;

The flashing lamp (if there was one) will change back to a steady glow.

- b. If you made an external enquiry call, or answered another external call.
 - 1 Press the switch hook briefly and listen for Ensign dial tone.
 - 2 Press H ;

The flashing lamp (if there was one) will change back to a steady glow.

Shuttling

During an enquiry call you can alternate or 'Shuttle' between the enquiry extension and the held call.

To shuttle between an enquiry call and the held call:

1 During the course of the enquiry, ask the user at the called extension to hold on while you return to the held call.

- 2 Press [H]; this 'holds' the enquiry call, and reconnects you to your original caller.
- 3 If you press H again, the original call will once again be held, and you can speak to the enquiry extension.

This shuttling sequence can be repeated as much as you wish by subsequent depressions of [H] but you cannot speak to the held caller and the enquiry extension at the same time unless you use the Three Party facility. (See page 63 for details of Three Party calls).

2.8.8. CALL TRANSFER (AND REVERSION)

Any incoming or outgoing call may be transferred to another extension.

To transfer a call

- 1 Tell the caller what you are going to do.
- 2 Press [H]; this will 'hold' the original call
- 3 Call the required extension in the usual way.
- 4 When the extension user answers, explain that you are transferring a call (this conversation cannot be overheard by the held caller).
- 5 Replace the handset the call will automatically be transferred.

If the called extension answers, but does not want to accept the call, you may:

either: wait for the called extension user to replace his handset. You will then hear Ensign dial tone and can try another extension;

or: press H to return to the held caller.

If the called extension does not answer or is engaged, you have a choice of actions depending upon whether you are transferring an internal call or an exchange call.

a. Internal Call

either: press the switch hook for a moment; you will then hear Ensign dial tone and can try another extension;

or: press H to return to the held caller.

b. Exchange Call

If you have ringing tone:

either: wait until the extension answers, and then replace the handset;

or: replace the handset at once – Ensign will transfer the waiting call when the extension answers.

If you hear engaged tone:

either: press [H] to return to the held caller;

or: replace the handset – Ensign will transfer the waiting call when the extension becomes free.

If the called extension does not answer or become free within 30 seconds, the waiting call will ring your extension again — this is known as a reverted call.

To answer a reverted call

a. If the terminal has a REVERTED CALL button:

When a reverted call is received, you will hear external ring tone, and the lamp by the REVERTED CALL button will flash.

- 1 Lift the handset and listen for Ensign dial tone.
- 2 Press <u>REVERTED CALL</u> the lamp will go out and you will be connected to the reverted call.

b. If the terminal does not have a **REVERTED CALL** button:

When a reverted call is received, you will hear external ring tone, but you will not be able to tell that you are answering a reverted call.

1 Lift the handset and answer in the normal way.

To accept a transferred call

If another extension user invites you to accept a transferred call:

- 1 Do not replace the handset wait for the calling extension user to replace theirs
- 2 The call will then be automatically transferred to you.

Up to 10 numbers can be stored in Ensign's memory. One number can be stored against each of the keypad digits 1-0, and each stored number can contain up to 18 digits.

To Store a Repertory Called Number:

NOTE

Where a pause for dial tone is required, e.g., when obtaining an exchange line via a PBX, the T button should be pressed once at the relevant point to insert a pause in the stored number train.

- 1 Lift the handset and listen for Ensign dial tone.
- 2 Press P and hold it down. (until step 6).
- 3 Press T
- 4 Press the keypad digit which you wish to programme.
- 5 Key the digits of the number you wish to store.
- 6 Release the P button.
- 7 Listen for Ensign dial tone this shows that the number has been stored.
- 8 Replace the handset.

To Change a Repertory Called Number:

Repeat the above sequence; the new number keyed in Action 5 will replace the previously stored number.

To Delete a Stored Number:

Repeat the above sequence with the exception of Action 5.

To Call a Stored Number:

- 1 Lift the handset and listen for Ensign dial tone.
- 2 Press T
- 3 Press the digit against which the required number has been stored.

2.8.10. REPETITION OF LAST NUMBER CALLED

The last exchange number called by keying in full is stored until another exchange call is keyed, even though internal calls, or exchange calls using repertory calling, have been made in the meantime.

To Repeat the Last Number Called:

- 1 Lift the handset and listen for Ensign dial tone.
- 2 Press T twice.

If the system is connected to a PBX, it may be necessary to obtain the public exchange dial tone before pressing $\boxed{\top}$ twice

How to Store the Last Number Called

In most cases, the last exchange number called can be added to the repertory store for future use, but please note that this facility is not available if the number was obtained via a PBX.

To store the last exchange number called:

- 1 Lift the handset and listen for Ensign dial tone.
- 2 Key '5' on the keypad.
- 3 Press the keypad digit which you wish to programme.
- 4 Listen for Ensign dial tone this shows that the number has been stored.
- 5 Replace the handset.

2.8.11. DIVERSION

The diversion facility enables you to divert all incoming calls to a chosen extension. you may also be able to receive calls diverted from another extension.

The terminal which diverts its calls is known as the **Diverting Terminal**, and the extension which receives the diverted calls is known as the **Nominated Terminal**.

You can choose the nominated Terminal to which you want your calls diverted at any particular time, either by means of a **REDIRECT** button when provided, or by means of the keypad.

During diversion, all the usual facilities such as outgoing calls and repertory calling, are still available.

To programme the **REDIRECT** button

1 Lift the handset and listen for Ensign dial tone.

2 Press P and hold it down until stage 5 is reached.

Press REDIRECT . 3

- 4 Using the keypad, key the number of the extension to which the calls are to be diverted. (The lamp by the REDIRECT button will light.)
- 5 Release P.
- 6 Listen for Ensign dial tone this shows that the number has been stored.
- 7 Replace the handset.

The terminal is now programmed to divert calls, but if you do not want to use the facility at once: press <u>REDIRECT</u> – the lamp will go out.

To change the number of the Nominated Terminal:

Repeat the above sequence, keying in the new number at Action 4.

To erase a number without putting in an alternative;

Repeat the above sequence, with the exception of Action 4.

NOTE: If mains power is lost (e.g. through failure in the supply, or because it is switched off at night) the stored number is erased. The **REDIRECT** button must therefore be re-programmed when the power is restored.

To divert calls

- a. Using the **REDIRECT** button.
- 1 Make sure that you have already programmed the button.
- 2 Press <u>REDIRECT</u>, whether the handset is on or off its rest. The lamp beside the button will light to remind you that calls are being diverted.

When an exchange line call is received under re-direct conditions the associated lamp will flash as usual but the sounder will not ring. The flashing lamp will change to a steady glow when the Nominated Terminal answers the call.

When an internal call is received, there is no lamp or tone-sounder signal.

b. Using the keypad

- 1 Lift the handset and listen for Ensign dial tone.
- 2 Key '41' followed by the number of the Nominated Terminal.
- 3 Replace the handset.

This sequence both programmes and activates the facility - all incoming calls will now be diverted.

To answer a call from the Nominated Terminal

The Nominated Terminal can get in touch with you even when diversion is being used, to make an enquiry or to see if you wish to deal with a particular call personally.

- 1 When the Nominated Terminal calls during diversion, the sounder will ring.
- 2 Lift the handset and answer in the usual way.
- 3 To accept the call, **do not replace the handset**. Wait for the Nominated Terminal to transfer the call.

To end diversion

a. Using the **REDIRECT** button.

Press **REDIRECT**. Diversion has now stopped, and the number of the Nominated Terminal is stored in the button for future use.

- b. Using the keypad
- 1 Lift the handset and listen for Ensign dial tone.
- 2 Key '42' on the keypad, and replace the handset. This sequence ends diversion, and also erases the number of the Nominated Terminal you must therefore go through the keying '41' sequence again next time you want to divert your calls.

Answering Diverted Calls

The nominated terminal does not require any special press-buttons in order to receive diverted calls.

If you have a Named Intercom button for calling the Diverting Terminal, the lamp beside it will light whenever the handset at the Diverting Terminal is lifted (whether diversion is being used or not). This will tell you that the terminal is attended, even though the user may not be answering calls.

To answer a diverted internal call

- 1 The internal ringing signal will be heard, but you will not be able to tell that you are answering a diverted call.
- 2 Lift the handset you will be connected to the call, and can also hold or transfer it if you wish.

To answer a diverted exchange line call

a. On lines normally answered via an ANSWER EXCHANGE button

- 1 The external ringing signal, will be heard, but you will not be able to tell that you are answering a diverted call.
- 2 Lift the handset and press <u>ANSWER EXCHANGE</u>. You will be connected to the call, and can also hold or transfer it if you wish.

b. On lines normally answered by the Diverting Terminal

In this instance, although you can use a <u>LINE xx</u> button to make outgoing calls at any time, incoming calls will be received **only** when diverted from the Diverting Terminal.

- 1 The external ringing signal will be heard, and the lamp by the appropriate LINE xx button will flash.
- 2 Lift the handset and listen for Ensign dial tone.
- 3 Press the appropriate LINE xx button you will be connected to the call and can also hold or transfer it if you wish.

To call the Diverting Terminal

- You can call the Diverting Terminal at any time, whether diversion is being used or not.
- 1 Lift the handset and listen for Ensign dial tone.
- 2 Either: press the appropriate Named Intercom button
 - Or: key the number of the Diverting Terminal.

To refer a call back to the Diverting Terminal.

A diverted call which has been answered can be referred back to the Diverting Terminal.

'Having answered the call:

- 1 Press H to put the call into 'hold' and listen for Ensign dial tone.
- 2 Either: press the appropriate Named Intercom button
 - Or: key the number of the Diverting Terminal.
- 3 Ask the Diverting Terminal if he wishes to accept the call this conversation cannot be overheard by the held caller.

If the diverting Terminal agrees to accept the call:

4 Replace your handset.

If the Diverting Terminal is engaged, does not answer, or answers but does not wish to accept the call:

5 press H ; you will then be reconnected to the held caller.

Joint Nominated/Diverting Terminal

The extension may be both a Nominated Terminal and a Diverting Terminal; that is, you can divert your own calls, and also receive calls from a Diverting Terminal.

In this case, when you press **REDIRECT** (or key '41') your own incoming calls will be diverted to a Nominated Terminal, but you will continue to receive calls from a Diverting Terminal, i.e. they will not be re-routed to your Nominated Terminal.

2.8.12. THREE PARTY CALL

This facility enables 3 Ensign extensions, or 2 Ensign extensions and one external caller (exchange line or PBX extension) to speak together. For instance,

an extension engaged on an external call can bring in a second extension, or,

an extension engaged on an internal call can bring in a third extension or an external caller.

A Three-party Call can be set up either by means of a <u>THREE PARTY</u> button if the terminal has one, or by keying '3'. The lamp by a <u>THREE PARTY</u> button will glow whilst a Three-Party Call is in progress.

To set up a Three-Party Call

While connected to a call (which may be incoming or outgoing):

- 1 Press H ; this will put the existing call into 'hold'.
- 2 Call the third party in the usual way.

If the third party answers and agrees to join the call:

- 3 Press <u>H</u>; this will put the third party into 'hold' and reconnect you to your original call.
- 4 Press THREE PARTY (or key '3') all three parties are now connected together.

If the third party is engaged, does not answer, or answers but does not wish to join the call:

3 Press H ; you will be reconnected to your original call.

To join a Three-Party Call

a e e

- 1 When your extension rings, answer the call as usual.
- 2 On being invited to join a Three-Party Call, listen on the handset until you hear the other 2 participants. You can then all speak together.

To leave a Three-Party Call

Replace the handset. The extension will resume normal operation; the other 2 parties will remain connected until they too, replace their handsets.

The lamp by a THREE PARTY button will go out when any of the three parties replaces the handset.

2.8.13. DIRECT VOICE CALLING

The terminal may have a SPEAK button which enables you to make a call to a terminal fitted with a loudspeaker and be heard without the called user having to lift his handset.

To make a direct voice-call:

- 1 Call the required terminal in the normal way.
- 2 When you hear system ringing tone, press SPEAK .

The ringing tone will stop; you will be connected to the called terminal and may give your message.

If the ringing tone does not stop when you press SPEAK, this means that the called terminal has not got a loudspeaker, and you will have to wait for the user to answer your call in the usual way.

To clear an outgoing voice-call:

Replace the handset.

NOTE:

It is not possible to transfer a call by means of direct voice calling.

Receiving a direct voice-call:

If the terminal has a loudspeaker and a <u>MONITOR</u> key, you will be able to receive an internal call without lifting your handset.

- 1 You will hear a short burst on the tone-sounder, followed by the message.
- 2 If you wish to reply, lift your handset. The loudspeaker will switch off and the call may proceed as usual.
- 3 Replacing the handset will switch the loudspeaker on again.

To clear an incoming voice-call:

The call is normally cleared by the caller, but if you wish to clear it yourself, press MONITOR . If you are using the handset when the call ends, replace it before pressing MONITOR .

2.8.14. MONITOR

If the terminal has a loudspeaker and a <u>MONITOR</u> button, you can monitor the progress of outgoing calls and amplify incoming speech without using your handset. The operating sequence will vary a little, depending upon the type of equipment fitted in your terminal.

To monitor outgoing calls:

- 1 Press MONITOR ; the lamp by the button will light, and you will hear Ensign dial tone through the loudspeaker.
- 2 Key the required number in the usual way.
- 3 When you hear the called party answer in the loudspeaker, lift the handset this transfers the call to the handset.
- 3 If the called party does not answer, press MONITOR again.

When you have finished the call, replace the handset – if the lamp does not go go out: press MONITOR .

To amplify incoming speech:

You can also amplify incoming speech on exchange and internal calls, whether you have made or received them.

While engaged on a call:

- 1 Ask the other party to wait, then press MONITOR .
- 2 Replace the handset.

This will route the incoming speech through the loudspeaker, but remember that you must lift the handset again before your reply can be heard.

The handset may be lifted and replaced as often as you wish.

When you have finished the call:

1 If you are listening to the loudspeaker - press MONITOR .

If you are using the handset – replace it. (Should the lamp not go out at this point, press MONITOR).

The volume of the loudspeaker can be adjusted to soft, medium or loud by moving the knurled wheel at the back of the terminal, just beneath the handset rest.

2.8.15. NIGHT SERVICE (Facility Pack 8 Only)

If the terminal has a <u>NIGHT SERVICE</u> button you can arrange for all incoming exchange line calls to ring other extensions when you are unable to deal with them yourself.

To initiate Night Service

Press NIGHT SERVICE ; the associated lamp will light.

Incoming exchange line calls will now ring all other extensions in addition to your own. (Any calls which were already ringing when you pressed NIGHT SERVICE) can be answered only at your terminal).

Incoming internal calls will continue to ring at your terminal only.

To cancel Night Service

Press NIGHT SERVICE again — the lamp will go out, and incoming exchange line calls will ring your terminal as usual.

To answer a Night Service call

Answer call in normal way.

If you do not want to receive night service calls, they can be diverted by using the Diversion facility.

2.8.16. TRANSFER DIAL TONE (Facility Pack 8 Only)

This facility is available only on a terminal which serves as an Ensign System Operator's position (indicated by the presence of a <u>NIGHT SERVICE</u> button); it enables the System Operator to transfer exchange dial tone to extensions which otherwise would be barred from making their own outgoing exchange calls.

To transfer dial tone

The keying sequence will vary, depending upon whether the extension is holding on, or whether it wants you to ring back.

a. When the extension is holding on

- 1 Press H this will put the waiting caller in 'hold'.
- 2 Listen for Ensign dial tone.
- 3 Key '9' and listen for exchange dial tone.
- 4 On hearing exchange dial tone, replace the handset.

b. When the extension wants you to ring back

- 1 Lift the handset and listen for Ensign dial tone.
- 2 Key '9' and listen for exchange dial tone.
- 3 On hearing exchange dial tone, press H.
- 4 Call the required extension in the usual way.
- 5 When the extension answers, replace the handset.

In every case, the barred extension can make only **one outgoing call**; subsequent calls can be made only by asking for dial tone again.

2.8.17. HEADSET

If the terminal has a socket for a headset, there will also be a CALL/CLEAR button.

When the headset is not plugged-in, the handset is used in the normal way. Inserting the headset plug into the socket disconnects the handset, so it is not possible for someone else to listen in on the handset.

To make a call

- 1 Press CALL/CLEAR ; the lamp by the button will light.
- 2 On hearing Ensign dial tone, proceed as if using the handset.

To answer an exchange call

- 1 Press CALL/CLEAR (the lamp will light).
- 2 Press the appropriate LINE xx button, or the ANSWER EXCHANGE button, according to the usual method of answering an exchange line call.
- 3 Thereafter, proceed as if using the handset.

To answer an internal call

- 1 Press CALL/CLEAR (the lamp will light).
- 2 Thereafter, proceed as if using the handset.

To clear a call

Press CALL/CLEAR again. (The lamp will go out).

Remember:

You MUST unplug the headset before you can change back to the handset.

2.8.18. TO PROGRAM A NAMED INTERCOM PRESS-BUTTON

The extension numbers allocated to facility buttons when the system is initially configured (named intercom buttons), can be reprogrammed so as to give access to any chosen extension number.

Should you misoperate any press-buttons or keys during programming you will hear Number Unobtainable tone. In this event, replace your handset and start again.

To program a named intercom press-button

- 1 Lift the handset and listen for Ensign dial tone.
- 2 Press P and hold it down.
- 3 Press the Named Intercom button which you wish to program.
- 4 Using the keypad, key the number of the required extension.
- 5 Release P.
- 6 Listen for Ensign dial tone -- this shows that the keypad number has been accepted.
- 7 Replace the handset.
- 8 Remember to make a note on the label beside the Named Intercom button.

To change a programmed number

Repeat the above procedure; the new number keyed in Action 4 will replace the previously stored number.

To erase a programmed number

If you wish to erase a programmed number without inserting another, repeat the above procedure with the exception of Action 4.

2.8.19. SUMMARY OF FACILITY "DIAL-UP" CODES

0	Call Ensign Operator		
1	Cancel Ring-when-free		
2	Ring-when-free		
3	Three-Party Call		
40	Recall parent PABX		
41	Divert calls		
42	Cancel diversion of calls		
44	Repeat last number		
50-59	Store Rep.Calling numbers		
60-69	Call Rep. Calling numbers		
9	Outgoing line access		

SECTION THREE 2 WIRE EXTENSION TELEPHONE

3.1. GENERAL

Providing it uses loop-disconnect signalling and can be wired as a "2 wire PBX extension with earth loop recall", then virtually any standard telephone can be used on Ensign. The tones and ringing signals that will be heard are the same as those on 4W extensions.

3.2. TONES AND RINGING SIGNALS

The following tones and ringing signals will be heard at 2W extensions,

Ensign dial tone		a continuous high pitched two tone sound.		
Exchange tones	_	The familar exchange tones will be heard when making external calls		
Internal ring tone	—	a repeated 'burr' on calls to other extensions		
Engaged tone	_	a repeated single note		
N.U. tone		a continuous high pitched monotone.		
The 2 wire extension will give two types of ringing signal.				
External ringing	_	bursts of 2 rings separated by short pauses, on calls from the public exchange or a PBX.		
Internal ringing		long single rings separated by long pauses, on calls from other extensions.		

Internal calls take precedance over external calls, so ringing will change from external to internal if an extension calls whilst an external call is ringing the telephone. On telephones that can be equipped with a second push button, a bell ON/OFF facility can be provided.
3.3 TELEPHONE LABELS

Sufficient labels printed with the extension numbers are provided in the label pack for various 2 wire telephones. The Ensign telephone labels should be utilized for standard press button instruments. The principal exchange line number should be entered on the label if so requested.

3.4 TELEPHONE CONNEXIONS

3.4.1 **Providing the HOLD Button**

Telephones that are available from stores ready connected as "2 wire PBX extensions with recall", (e.g. Tele 8746GR) can be used on Ensign without modification. In other cases, a HOLD switch must be provided as shown in the diagram below.



3.4.2 Providing Bell ON/OFF Facility

A bell ON/OFF facility can be provided only if the telephone can be fitted with a locking press button, in addition to the button used for hold.

It should be fitted as shown in the diagram below, so as to DISCONNECT the bell circuit.



3.5 SUBSIDIARY EQUIPMENT

3.5.1 Extension Bells

One high impedance extension bell may be associated with a 2 wire extension. This arrangement may be repeated as often as required subject to the overriding limitation of the number of 'bells' on the system, i.e. approximately 10 bells or tone callers may be rung simultaneously. The wiring of the extension bell is shown in the following diagram.



If a switch is required to turn the extension bell on and off, then the cable to the extension bell should be interrupted at a convenient point with a block terminal, and a suitable ON/OFF switch wired to it, so as to disconnect the bell when required.

3.5.2. Add-on Equipment

A wide range of equipment can be used in conjunction with Ensign. In general, apparatus suitable for use on direct exchange lines can be used on 2 W Ensign extensions.

Telephone instruments which are not fitted with an earth recall button can be provided if the user is prepared to forego the facilities accessed with the button i.e. 'Hold for Enquiry', 'Recall', etc.

3.5.3 Extension Plans

Apart from 'PHONE SOCKET', extension plans are not permitted. If 'PHONE SOCKET' is required, then it should be wired as shown below. A MAXIMUM OF 2 TELEPHONES IS PERMITTED but any number of line jack units can be provided. Because of the limit of 2 bells per extension, then it will not be possible to provide an extension bell with 2 telephones.



3.6. FACILITIES AND OPERATING THE 2 WIRE EXTENSION

3.6.1. ANSWERING INCOMING CALLS

When an incoming call is received, the ringing signal will tell you whether it is internal or external.

3.6.2. MAKING EXTERNAL CALLS

Exchange Calls

- 1 Lift the handset and listen for Ensign dial tone.
- 2 Key '9'.

If there is a free exchange line you will hear exchange dial tone.

If all exchange lines are already in use you will hear Ensign engaged tone.

NOTE:

If the extension is barred from making certain types of exchange calls you will hear number unobtainable tone during the keying sequence. Exchange calls to Emergency Services (999) will not be barred.

Calls via a PABX or PMBX

If an extension from a PABX or PMBX is connected to the extension it can be used for calling other extensions on the PABX/PMBX, or for making exchange line calls.

To Make a Call Via a PABX:

- 1 Lift the handset and listen for Ensign dial tone.
- 2 Key '9'.

You will then hear the PABX system dial tone and can key the required extension, number, or key '9' to obtain exchange dial tone.

To Make a Call Via a PMBX:

- 1 Lift the handset and listen for Ensign dial tone.
- 2 Key '9' and wait for the PMBX operator to answer.

3.6.3. CALLING A PBX OPERATOR

If the Ensign is connected to a PABX or PMBX you can contact the operator and also use the facilities of the PBX.

To call a PABX operator

- a. If you are NOT engaged on a call on a PABX-line
- 1 Lift the handset and listen for Ensign dial tone.
- 2 Key '9'.
- 3 Listen for PABX dial tone.
- 4 Key '0' and wait for the PABX operator to answer.
- b. If you are already engaged on a call on a PABX-line:
- 1 Press HOLD.

The call in progress will be held, and you will hear Ensign dial tone.

2 Key '40' and wait for the PABX operator to answer.

If you wish to return to the held call: Press HOLD again.

To call a PMBX operator:

- a. If you are NOT engaged on a call on a PMBX-line
- 1 Lift the handset and listen for Ensign dial tone.
- 2 Key '9' and wait for the PMBX operator to answer.
- b. If you are already engaged on a call on a PMBX-line:
- 1 Press HOLD

The call in progress will be held, and you will hear Ensign dial tone.

2 Key '9' and wait for the PMBX operator to answer.

The PMBX operator then normally holds or transfers the call.

If you wish to return to the held call:

Ask the PMBX operator to connect you.

NOTE:— On certain telephones the HOLD button may be labelled RECALL because of the non-availability of buttons marked HOLD. It should be remembered that the RECALL FUNCTION IS ACHIEVED BY DIALLING 40, after pressing the HOLD button.

3.6.4. CALLS TO AN ENSIGN SYSTEM OPERATOR

An Ensign Terminal may have been designated to act as a system operator's position for connecting calls and giving assistance, etc. (Facility Pack 8)

To call the Ensign system operator

- 1 Lift the handset and listen for Ensign dial tone.
- 2 Key "0", as an alternative to keying the terminal number.

Should the system not have an operator's position, you will hear number unobtainable tone on keying "0".

3.6.5. MAKING INTERNAL CALLS

Internal calls are made by keying the required extension number.

3.6.6. **RING-WHEN-FREE**

If you hear engaged tone when you call another Ensign extension, you can programme Ensign to call the extension again when it becomes free.

To Initiate a Ring-when-free Call

- 1 On hearing engaged tone, key "2"
- 2 Listen for Ensign dial tone this shows that the, instruction has been accepted. (If the facility is already in use, you will hear number unobtainable tone, and will have to call the extension again later in the usual way.)
- 3 Replace the handset.

When the called extension is free, your extension will ring with the internal call cadence. On lifting the handset, you will hear ringing tone as the required extension is called.

If the called extension becomes re-engaged before the ring-when-free call is effected, the ringing tone will stop. In this case, replace the handset – Ensign will try again when both parties are free.

To Cancel a Ring-when-free Call

- 1 Lift the handset and wait for Ensign dial tone;
- 2 Key "1"
- 3 Listen for Ensign dial tone this shows that the instruction has been accepted.

A ring-when-free call is automatically cancelled if:--

- a. the other extension successfully calls you;
- b. you don't answer your extension on a ring-when-free call within one minute of the start of ringing.

3.6.7. HOLD FOR ENQUIRY

One incoming or outgoing call may be 'held' while, for instance, you make an enquiry to another extension or over an exchange line.

To hold a call

1 Press HOLD and listen for Ensign dial tone.

The original call is now 'held' and you can make an internal or exchange call as you wish, by following the normal operating procedure.

When you have finished the enquiry call, or if the called extension was engaged or did not answer, you can return to the held call.

To return to the held call

1 Press HOLD you will now be able to speak to the held caller again.

Shuttling

During an enquiry call you can alternate or 'Shuttle' between the enquiry extension and the held call.

To shuttle between an enquiry call and the held call:

- 1 During the course of the enquiry, ask the user at the called extension to hold on while you return to the held call.
- 2 Press HOLD ; this 'holds' the enquiry call, and reconnects you to your original caller.
- 3 If you press HOLD again, your original call will once again be held, and you can speak to the enquiry extension.

This shuttling sequence can be repeated as often as you wish by subsequent depressions of [HOLD] but you cannot speak to the held caller and the enquiry extension at the same time unless you use the Three Party facility.

NOTE:— On certain telephones the HOLD button may be labelled RECALL because of the non-availability of buttons marked HOLD. It should be remembered that the RECALL FUNCTION IS ACHIEVED BY DIALLING 40 after pressing HOLD button.

3.6.8. CALL TRANSFER (AND REVERSION)

Any incoming or outgoing call may be transferred to another extension.

To transfer a call

- 1 Tell the caller what you are going to do.
- 2 Press HOLD ; this will 'hold' the original caller.
- 3 Call the required extension in the usual way.
- 4 When the extension user answers, explain that you are transferring a call (this conversation cannot be overheard by the held caller).
- 5 Replace the handset the call will automatically be transferred.

If the called extension answers, but does not want to accept the call, you may:

- either: wait for the called extension user to replace their handset. You will then hear Ensign dial tone and can try another extension;
- or: press HOLD to return to the held caller.

If the called extension does not answer or is engaged, you have a choice of actions depending upon whether you are trying to transfer an internal call or an exchange call.

a. Internal call

- either: replace the handset for a moment. On lifting it again you will hear Ensign dial tone and can try another extension;
- or: press HOLD to return to the held caller.

b. Exchange call

If you hear ringing tone:

- either: wait until the extension answers, and then replace the handset;
- or: replace the handset at once Ensign will transfer the waiting call when the extension answers.

If you hear engaged tone:

either: press HOLD to return to the held caller;

or: replace the handset – Ensign will transfer the waiting call when the extension becomes free.

If the called extension does not answer or become free within 30 seconds, the waiting call will ring your extension again — this is known as a **reverted call**.

To answer a reverted call

When a reverted call is received, you will hear external ring tone, and you will not be able to tell that you are answering a reverted call. Answer in the normal way.

To accepted a transferred call

If another extension invites you to accept a transferred call:

Do not replace the handset - wait for the calling extension user to replace theirs

The call will then be automatically transferred.

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3.6.9. REPERTORY CALLING*

10 exchange line numbers can be stored in Ensign's memory, against each of the keypad, or dial digits 1-0, and each stored number can contain up to 18 digits.

To Store a Repertory Called Number

- 1 Call the required number in the usual way, and when you hear ringing or engaged tone replace the handset it is not necessary to speak to the called number unless you wish to do so.
- 2 Lift the handset again and listen for Ensign dial tone.
- 3 Key '5'
- 4 Press the keypad digit that you want to store the number against.
- 5 Listen for Ensign dial tone this tells you that the number has been stored.
- 6 Replace the handset.

To Change a Stored Number

Repeat the above procedure.

To Make a Call Using Repertory Dialling

- 1 Lift the handset and listen for Ensign dial tone.
- 2 Key '6'.
- 3 Key the digit against which the number you want has been stored.

Ensign will then call the stored number for you.

*NOTE: This facility may not be available if the Ensign is connected to a P.B.X.

3.6.10. REPETITION OF LAST NUMBER CALLED*

The last exchange number called by keying in full is stored in Ensign's memory until another exchange call is keyed although you may have made internal calls, or exchange calls via repertory calling, in the meantime.

*NOTE: This facility may not be available if the Ensign is connected to a P.B.X.

To Repeat the Last Number Called:

- 1 Lift the handset and listen for Ensign dial tone.
- 2 Key '44'

3.6.11. DIVERSION

Diversion of incoming calls

The diversion facility enables you to divert all incoming calls to another extension of your choice.

The extension which diverts its calls is known as the Diverting Terminal, and the extension which receives the diverted calls is known as the Nominated Terminal.

During diversion, facilities such as outgoing exchange line and internal calls, repertory calling, etc, are still available at both the Diverting and Nominated Terminals.

The following notes are divided into 2 sections:

Diverting Terminal – how to divert calls.

Nominated Terminal - how to answer diverted calls.

Diverting Terminal

You can choose the Nominated Terminal to which you want the calls diverted at any particular time.

To Divert Calls to a Nominated Terminal:

- 1 Lift the handset and listen for Ensign dial tone.
- 2 Key '41'.
- 3 Key the number of the Nominated Terminal.
- 4 Replace the handset.

The facility has now been activated; all normal incoming calls will be diverted to the Nominated Terminal, and your bell will not ring.

The Nominated Terminal can get in touch with you, even when diversion is being used, to make an enquiry or to see if you wish to deal with a particular call personally.

To Answer a Call From the Nominated Terminal

- 1 When the Nominated Terminal wishes to contact you during diversion, your bell will ring.
- 2 Lift the handset and speak to the Nominated Terminal.
- 3 If you want to accept the call **do not replace the handset.** Wait for the Nominated Terminal to transfer the call to you.

To End Diversion:

- 1 Lift the handset and listen for Ensign dial tone.
- 2 Key '42'
- 3 Replace the handset.

Nominated Terminal

The extension does not require any special press-buttons in order to receive diverted calls.

To Answer A Diverted Cal

When a diverted call is received, you will hear external or internal ringing as appropriate, but you will not know whether the call is diverted or the number of the Diverting Terminal.

Lift the handset – you will be connected to the incoming call (and can then hold or transfer it if you wish).

You may contact a Diverting Terminal at any time, whether diversion is operative or not.

To Contact a Diverting Terminal:

- 1 Lift the handset and listen for Ensign dial tone.
- 2 key the number of the Diverting Terminal.

A diverted call can be referred back to the Diverting Terminal.

To refer a call back to a Diverting Terminal:

Having answered the call;

- 1 Press HOLD , and listen for Ensign dial tone.
- 2 Key the number of the Diverting Terminal.
- 3 Ask the Diverting Terminal if he will accept the call (this conversation cannot be overheard by the held caller); if he agrees, replace your handset.

If the Diverting Terminal is engaged, does not answer, or answers but does not wish to accept the call, press HOLD again; you will then be reconnected to the caller.

Joint Nominated/Diverting Terminal

The extension may be both a Nominated Terminal and a Diverting Terminal; that is, you can divert your own calls, and also receive calls from a Diverting Terminal. In this case, when you key '41' your own incoming calls will be diverted to a Nominated Terminal of your choice, but you will continue to receive calls from the Diverting Terminal, i.e., they will not be re-routed to your Nominated Terminal.

NOTE: On certain telephones the HOLD button may be labelled RECALL because of the non-availability of buttons marked HOLD. It should be remembered that the RECALL FUNCTION IS ACHIEVED BY DIALLING 40. after pressing the HOLD button.

3.6.12. THREE PARTY CALL

This facility enables 3 Ensign extensions, or 2 Ensign extensions and one external caller (exchange line or PBX extension) to speak together:

an extension engaged on an external call can bring in a second extension;

an extension engaged on an internal call can bring in a third extension or an external caller.

To set up a Three-Party Call by bringing in another Ensign extension

While connected to an internal or external call (which may be incoming or outgoing:)

- 1 Press HOLD ; this will put the existing call into 'hold'
- 2 Call the required Ensign extension in the usual way.

If the extension answers and agrees to join the call:

3 Key '3' on the keypad – all 3 parties are now connected together.

If the called extension is engaged, does not answer, or answers but does not wish to join the call:

3 Press HOLD ; you will be reconnected to the held caller.

To set up a Three-Party Call by bringing in an exchange line caller

While connected to an internal call (which may be incoming or outgoing):

- 1 Press HOLD ; this will put the existing call into 'hold'.
- 2 Make the exchange line call in the usual way.

If the called number answers and agrees to join the call:

- 3 Press HOLD ; this will put the exchange line call into 'hold' and reconnect you to the held internal call.
- 4 Key '3' on the keypad all 3 parties are now connected together.

If the called exchange line number is engaged, does not answer, or answers but does not wish to join the call:

3 Press HOLD ; you will be reconnected to the held Ensign extension.

To join a Three-Party Call

- 1 When the extension rings, answer the call as usual.
- 2 On being invited to join a Three-Party Call, listen on the handset until you hear the other 2 participants. You can then all speak together.

To leave a Three-Party Call

Replace the handset. Your extension will resume normal operation; the other 2 parties will remain connected until they too replace their handsets.

3.6.13. NIGHT SERVICE

An Ensign Terminal may have been designated to act as an operator's terminal for connecting calls and giving assistance.

Should the Ensign have an operator's terminal, you may receive calls which have been transferred to you under "Night Service" arrangements.

To Answer a Night Service Call

The extension will ring in the usual way, but you will not be able to tell that you are answering a Night Service call.

Lift the handset – you will be connect to the incoming call (and can then hold or transfer it if you wish).

If you do not want to receive night service calls, you may divert them using the diversion procedure described previously.

3.6.14. SUMMARY OF FACILITY "DIAL-UP" CODES

0	Call Ensign Operator	
1	Cancel Ring-when-free	
2	Ring-when-free	
3	Three party	
40	Recall parent PABX	
41	Divert calls	
42	Cancel diversion of calls	
44	Repeat last number	
50-59	Store Rep.Calling Nos.	
60-69	Call Rep. Calling Nos.	
9	Outgoing line access	

SECTION FOUR MAINTENANCE

MAINTENANCE POLICY 4.1.

In order to restore customer service as quickly as possible, a policy of 'changing-out' faulty apparatus should be adopted. On site repair of faulty items should be limited to the replacement of small parts, such as transmitter insets.

Present marketing policy for Ensign is to sell it outright in all cases and therefore all installations should be dealt with using the procedures for customer owned equipment.

4.2. ACCEPTANCE OF SYSTEM INTO MAINTENANCE

The Installation Group is responsible for:-

- Testing and ensuring the correct operation of the system. 1
- 2 Ensuring that documentation detailing the individual extension and exchange line packs is complete.
- 3 Explaining the basic operation of the system to the customer when it is commissioned. The Telecommunication Service Representative (T.S.R.) has overall responsibility for ensuring the customer understands the use of the system and its facilities.

4.3 MAINTENANCE PROCEDURE

In common with most electronic equipment, the Ensign system is expected to be generally reliable throughout its designed life but initially a high failure rate may occur as components go through the "burn in" period.

The facilities of the system are numerous however, so it is likely that at first many fault reports will be due to customers mis-operation. Maintenance Staff, therefore, should be fully conversant with the facilities of the system and be prepared to detect and remedy incorrect operating procedures.

The Ensign system is designed so that faults can be quickly localised to telephone instruments, wiring, or to units within the control cabinet. In common with established faulting techniques, fault reports should be considered carefully in order to deduce in which part of the installation the fault might lie.

Does the fault affect one or several extensions?

If one extension —	Probably the extension instrument, or the cabling to it. Test from the extension instrument first.
If several extensions $-$	Probably in the control cabinet. Test from the distribution unit in the control cabinet first.

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Phone sockets are provided for both 2W and 4W extensions, so telephones can be easily exchanged temporarily to prove if a fault is in an instrument. It should be noted that since the phone sockets are wired differently for 2W and 4W extensions, one type of telephone should not be plugged into the socket of the other type.

A test telephone or a Herald Audio Tester (H A T) may be used to prove the continuity of the speech and data pairs at the phone socket, and at intermediate test or connection points.

If, after testing on the distribution unit in the Control Cabinet a fault is localised to the equipment in the Control Cabinet, each circuit board should be replaced in turn as detailed in the Faulting Table until the fault is cleared. The Faulting Table should always be used until sufficient expertise is built up to identify faulty boards unaided.

4.4 MAINTENANCE INFORMATION

4.4.1. 2-Wire Telephones

Fault reports for 2-wire telephones should be treated following the normal procedures for standard telephones fitted with earth loop recall facilities.

In most cases an earth will be extended from the control cabinet to the telephone on a third wire and a local earth will not be provided.

It should be noted that the button fitted to the telephone is used for the 'hold' function on the Ensign system. Recall of the main exchange or parent PBX is achieved by dialling 40 after pressing the HOLD Button.

A Line Jack Unit --/1A will be used to terminate the telephone. The connections should be as follows.

'A' wire	White-Blue	Terminal	5
'B' wire	Blue-White	<i>''</i>	2
Earth	White-Orange		4

The usual conditions of negative 50 volt battery on the 'B' wire and earth on the 'A' wire should be found.

4.4.2. 4-Wire Telephones

The standard Ensign terminal is the HS instrument originally developed for the Herald Call Connect System and maintenance information concerning its use on that system is applicable to Ensign.

The telephone is connected to the control cabinet by two pairs of wires:-

I) Speech pair	_	used to transmit speech in both directions
		and to carry ringing current to operate the
		instrument's bell or sounder.

2) Data pair – used to transmit key pad and facility button information between the control cabinet and the instrument. D.C. power is sent over the pair from the control cabinet to power the LEDs and some of the internal circuitry of the instrument.

The following simple procedures should be carried out to test a terminal:-

- 1 Lift handset and listen for dial tone.
- 2 Key own extension number and listen for engaged tone.

Test 1 proves the telephone loop and continuity of the speech pair. Test 2 proves the continuity of the data pair.

A suspect telephone instrument should be temporarily exchanged with a maintenance spare, or a convenient working extension to prove the fault to the line or instrument.

Where a faulty instrument is permanently replaced, it will be necessary to transfer any extra equipment, such as loudspeakers and PCB's to the replacement. Details of the fitting of such items is given in the installation section of this book on pages 44-47.

Details of how to remove, and refit labels on the instruments are given on pages 42 and 43.

Faulting on 4-wire telephones should be restricted to changing transmitter or receiver insets, complete handsets and cords.

Both the line cord and handset cord are plug ended and plug into sockets contained in a compartment within the base of the instrument. The compartment lid retains the cords in position and is secured by a single captive screw. Handsets 16A or 16B may be fitted to the instruments; the latter is distinguishable by its "pepper pot" earpiece and a small recess under the earpiece.

A number of facility handsets are also available, but at present only two of them may be fitted to Ensign terminals.

Handset 16C	 amplified handset with volume control at rear of earpiece.
Handset 16E	 locking/non-locking on-off switch — used as a trans- mitter cut-off.

Transmitter Insets No. 16A should normally be used on Ensign terminals. High levels of side tone may result if Transmitter Insets No. 21 are used.

Access to the microphone and receiver insets or other components is obtained by removing the fixing screw at the receiver end of the handset and pulling the two halves apart, starting at the receiver end. **DO NOT** use a screwdriver or other blade to prise the sections apart.

To reassemble the handset, start at the transmitter end, engage the two 'pips', one either side of the cord entry, into their associated holes in the other half. Squeeze the two sections together. Replace the fixing screw.



Microphone and receiver insets are removed by pressing downwards on the centre of the retaining clips and sliding the clip towards the centre of the handset. Before removing an inset note how the leads are arranged to lie in the central groove. When replacing insets make sure that the leads are not trapped and that the clips are correctly positioned.



Removal of Transmitter and Receiver

NOTE: The cord grommet must lie in the position shown, that is with the waist of the grommet located in the projections of the transmitter retaining clip.

Instructions for the fitting of labels, loudspeakers, amplifier P.C.B.'s and extension bells to Ensign telephones are given in Section 2 of this book.

A Line Jack Unit . . . /3A should be used to terminate the telephone with the following connexions: –

Speech	ſ'A' wire	White-Blue	Terminal 5
	_'B' wire	Blue-White	Terminal 2
Data	ſ'C' wire	Orange-White	Terminal 3
	'D' wire	White-Orange	Terminal 4

A Test Probe may be plugged into the phone socket to give access to the line for testing purposes.

Typical Line Conditions

Power On	Meter Multirange No. 12 on 100V DC Scale
Data pair Speech pair	50 volts 50 volts
Power Off	Meter Multirange No. 12 on 20 M.ohm Scale

Typical Line Faults and their Effects

Speech Pair	
Fault	Fault Condition
Eth 'A' wire Eth 'B' wire	No fault conditon or noisy Permanent Engaged Tone (P E T) One way transmission Extension lock up
Dis 'A' wire Dis 'B' wire	No i/c or o/g calls
S/C both wires	P E T, No i/c or o/g calls
Data Pair	
Fault	Fault Condition
Eth 'C' wire Eth 'D' wire	No key function for o/g calls Receives i/c calls
Dis 'C' wire Dis 'D' wire	Facility buttons do not function, i/c calls only
S/C both wire	i/c calls only

4.4.3. Distribution Wiring

Continuity of the distribution wiring may be proved by using a Herald Audio Tester (H.A.T.) or test telephone, to monitor dial tone on the speech pair, and data on the data pair in the case of 4-wire telephones. Dial tone is the 'new' standard tone of 350Hz and 440Hz mixed, whilst data is heard as a rapid series of pips.

If either dial tone or data are absent after testing at the telephone socket, tests should next be carried out at the distribution unit in the control cabinet to prove the fault either into the distribution wiring or control equipment.

The distribution unit in the control cabinet is fitted with a series of pins which provide test access points for testing in and out of the system. An Ensign Test Plug Adaptor (see illustration below) plugs into these pins and, when engaged, brings the connexions out in a convenient form for testing. Insulation displacement terminations are used to terminate the distribution wiring so wires can be easily disconnected and reconnected when required for testing purposes. The layout of the terminations is shown in figure 6 on page 16.

Faults in the distribution wiring should be localised in the usual way.

Ensign Test Plug Adaptor



Note: The jack 606 is a 'Rapide' type socket which will allow a telephone, H.A.T. or Test Probe to be connected.

4.4.4. Exchange Lines

Faulty exchange lines may be tested from the distribution unit in the control cabinet in the usual way, but, where possible, the power to the Ensign Control Unit should be switched off before they are disconnected or reconnected. This will reduce the likelihood of damage to the control unit due to voltage surges on the exchange lines. The layout of the terminals on the distribution unit is shown in figure 6 on page 16. Remember the Ensign system must be 'parked' before the power to it is disconnected or reconnected.

Although it is not possible to 'busy-out' faulty exchange lines, they can be temporarily removed from a Dial 9 group, by re-setting their configuration switches (see Page 27).

4.4.5. Control Cabinet – Switch Settings, Alarms and Maintenance Procedures

Instructions for removing or fitting the cabinet's cover are given in the Installation section of this handbook on page 15. Detailed descriptions of the units in the cabinet are given on pages 100-104.

When a fault is localised to the control cabinet after testing on the distribution unit, the Faulting Table (pages 110-116) should be used to determine which units to replace and in what order. The maintenance Kit (see page 105) contains a complete supply of spare units to enable every unit in the control cabinet to be changed.

The Faulting Table is divided into three parts:-

Part 1

Common equipment faults - these will generally affect all extensions and lines.

Part 2

Extension unit interface faults – these will only affect a single extension, or extensions common to one extension unit.

Part 3

Line unit interface faults – these will only affect a single line, or lines common to one line unit.

The fault report should be examined to determine which extensions or lines are affected so as to identify the probable faulty units.

If the fault appears to be common to all extensions or lines, or if there is some doubt as to whether the common equipment is functioning correctly, the system should be fully tested by working through the common equipment tests and observing the symptoms.

Faults that appear to be limited to a small number of extensions, exchange lines or combinations of both, are likely to be found on an interface card. The part of the Faulting Table dealing with the relevant type of interface should be used.

It should be remembered that the 2 + 4 and 1 + 1 units terminate both exchange lines and extensions. For example, a case where the first two exchange lines and extensions 20 to 23 are out of order, would indicate that a fault on the 2 + 4 Interface Unit is likely. In such cases the most convenient part of the Faulting Table should be used. WHENEVER A UNIT OR CONNECTING CABLE IS REPLACED THE SYSTEM MUST FIRST BE PARKED UNTIL THE L E D EXTINGUISHES.

THE POWER MUST THEN BE DISCONNECTED.

THE UNIT MAY THEN BE REPLACED AND THE POWER RESTORED. FINALLY THE RUN/PARK SWITCH MUST BE RESTORED TO THE RUN POSITION AFTER OBSERVING THAT THE L E D IS PERMANENTLY ON WHILST IN PARK. THIS INDICATES THAT THE PROCESSOR IS FUNCTIONING AND WAITING TO RUN.

Configuration Switches

The configuration switches which are mounted on the Switch Unit fitted to the front of the Control Cabinet are used to allocated the facilities to each extension, and to set the system to work to whatever type of main exchange or P.B.X. it is connected to.

Details of the configuration switch settings are given on pages 27 and 33 in the installation section of this book.

Run/Park Switch

The Run/Park Switch is located on the right-hand side of the Switch Unit, immediately to the left of the system L.E.D.

The switch has two positions:-

- 1 Up Parked
- 2 Down Running (normal)

The Run/Park Switch is used to park, or 'turn off' the system so that maintenance work can be carried out. It is also necessary to park the system before any changes to the system configuration switches become effective. If any calls are in progress when the switch is set to park, the system waits until all calls have cleared before parking the system. During this waiting period, new calls cannot be originated.

It should be noted that the configuration switches are free to be altered at any time, but changes in their setting will have no effect until the system is parked, or experiences a power failure. If the switches are 'tampered with' when the system is in service, the changes will have no effect. However, when the power supply is interrupted or the Run/Park switch is put in to the 'Park' position, the processor will 'read' the new settings and cause the system to malfunction when it becomes operational again.

System Switch

The first module of four switches to the left of the Run/Park Switch is known as the System Switch. The left-hand switch of the four is set upwards for manual ringing, as received from a P.M.B.X., or downwards for automatic ringing, as from an exchange. The remaining switches are used to 'tell' the system how many exchange lines are connected to it. See page 27 for details of the settings of these switches.

System L.E.D.

The system L E D which is red in colour is fitted on the right-hand side of the Switch Unit and it indicates the state of the system. Under normal fault free running conditions the L E D flashes on and off for equal periods of 0.25 seconds.

Two fault conditions can be indicated:-

1 Processor fault

The L E D flashes ON for 2.0 seconds and OFF for 0.25 seconds — (long ON, short OFF).

This indicates that the processor has detected a fault in its own operation or memory, or in the power unit.

2 Configuration error

The L E D flashes ON for 0.25 seconds and OFF for 2.0 seconds – (short ON, long OFF).

This indicates that the configuration switches are not set correctly, i.e. incorrect number of exchange lines for the extension pack numbers selected, circuit boards missing or fitted in the wrong positions.

When the Run/Park switch is set to Park from the Run position, the system LED will glow continuously untill all the established calls on the system have cleared. When all the calls have cleared the system LED will be extinguished and the system will then be parked. The system LED will also be extinguished, however, when there is no power to the equipment so care should be taken to avoid confusing the two conditions.

The Run/Park switch should be set to Park before power is connected, or re-connected to the system. If the "powering-up" of the system is successful the system LED will glow continuously, after a delay of a few seconds, indicating that the system is parked and that the processor is ready to run.

System L E D Indications

ON

ON

ON

ON

0.25 secs.,

2.00 secs.,

0.25 secs.,

continuously.

FLASHING SEQUENCE

OFF

OFF

OFF

STATE

- Running (system O.K.)
- Processor fault.
- Configuration error.

_ [waiting to park

or Parked, waiting to run

OFF continuously

0.25 secs.,

0.25 secs.,

2.00 secs.

or - Power off

Parked



SYSTEM SWITCH

RUN/PARK SWITCH

SYSTEM LED

THE RUN/PARK SWITCH SHOULD BE IN THE PARK POSITION WITH THE SYSTEM L E D EXTINGUISHED BEFORE MAINS POWER IS DISCONNECTED FROM THE SYSTEM.

BEFORE MAINS POWER IS RECONNECTED, OR CONNECTED INITIALLY ON A NEW INSTALLATION, THE RUN/PARK SWITCH SHOULD BE CHECKED TO ENSURE IT IS IN THE PARK POSITION.

TO TAKE THE SYSTEM 'OUT OF SERVICE'

Set the RUN/PARK switch upwards to PARK.

The system L E D will glow continuously until all the established calls on the system have cleared.

This will be indicated by the L E D being extinguished. No new calls can be set up on the system once the switch has been set in the Park position.

Disconnect the mains power supply.

The system is now free for engineering changes or maintenance.

PROCEDURE TO BE FOLLOWED IN ORDER TO CONNECT THE MAINS POWER SUPPLY.

Set the RUN/PARK switch to the PARK position.

Connect and switch-on the mains supply.

There will be a short delay whilst the system powers-up, on the successful completion of which the LED changes to "STEADY-ON".

The System is now fully prepared for service but is PARKED, preventing any calls from being made.

If the L.E.D. remains dark check the mains connection and then refer to test 1/1 in the Faulting Table (Page 110).

If the L.E.D. flashes in any sequence, then refer to tests 1/2 and 1/3 in the Faulting Table (page 111).

PROCEDURE TO BRING THE SYSTEM INTO SERVICE FROM THE PARKED CONDI-TION WITH THE MAINS POWER SWITCHED ON.

Set the RUN/PARK switch to the RUN position.

There will be a short delay whilst the system goes through its self configuration and test routine, on the successful completion of which the LED changes to an equal short flash rate (twice a second).

The system is now in service and ready to handle all types of call.

If the flash rate "SHORT-ON, LONG-OFF" appears there is a configuration error. Check hardware and switches.

If "LONG-ON, SHORT-OFF" appears the processor test routine has detected a fault – refer to test 1/3 in the Faulting Table (page 111).

TO SET THE CONFIGURATION SWITCHES

These settings allocate facilities to extensions and configure the system for the required signals to the parent exchange.

All information for the settings is normally quoted on the installation description form.

Set the SYSTEM switch for the total number of external lines and the type of incoming ring, manual or auto. Set the configuration switch of each extension to the required pack number. A telephone of the SA 20000 type must be fitted with a label of the same number as the pack number.

Set the configuration switches of each exchange line to the required parameters (MF4 or LOOP/DIS, REGISTER or EARTH recall, IN or OUT of ANS EXCH group, IN or OUT of dial 9 group).

CHANGES TO THE CONFIGURATION SWITCH SETTINGS ARE NOT EFFECTIVE UNTIL THE RUN/PARK SWITCH HAS BEEN RESET FROM PARK TO RUN.

TO RECONFIGURE A WORKING SYSTEM

Set the RUN/PARK switch to PARK:- LED glows steady-on if calls are in progress. Wait until all calls have cleared, shown by a change to steady-off.

Re-set the configuration switches as required.

Set the RUN/PARK switch to RUN.

There will be a short delay whilst the system goes through its self configuration and test routine, on the successful completion of which the LED changes to an equal short flash rate. (4 per second).

The system is now reconfigured and ready to handle all types of call.

If the flash rate "SHORT-ON, LONG-OFF" appears there is a configuration error. Check the position of the switches.

4.4.6. Control Cabinet – Equipment Description

A control unit equipped for the smallest system available, i.e. two exchange lines and four extensions, consists of the following equipment.

1. Power Unit (Ensign Power Unit 1A1/SA 20302)

The power unit is fitted into the top left hand corner of the base. The lower edge is slotted into a base recess and the unit is retained by a single captive screw at the top.

Since the power units for Ensign are supplied by a number of manufacturers, they vary in appearance. Two typical examples manufactured by Farnell and T.M.C. respectively are illustrated opposite.

The T.M.C. power unit has a 1.6 amp fuse mounted externally and this may be replaced in the field with a Fuse 72/1.6. All other power units are fused internally and these fuses should not be replaced, but the complete power unit should be changed if the unit is faulty.

The following six output voltages are connected to the processor board by a multiway cord and connector: --

Neg 50V, for speech, data and LED circuits at the extensions, relays in the control unit, and for the 25Hz ringing amplifier.

Pos 40V, for ringing amplifier.

Pos 12V, for the crosspoint IC's and miscellaneous circuits.

Neg 12V, for P channel MOS and miscellaneous circuits.

Pos 5V, for the micro-processor

Pos 1.5V for a DC bias to be applied to each speech pair to ensure that speech currents do not reverse bias the crosspoint switch transistors.

2. Distribution Unit (Ensign Distn. Unit 1A1/SA 20309)

The distribution unit is fitted into the top right-hand corner of the base. The lower edge is slotted into a base recess and the top edge is fixed by a screw in both of the top corners.

It provides the flexibility and connection point for the system distribution wiring. I D C connexion strips are used. Two relays are mounted on the unit for the 'mains fail' switching of exchange lines 1 and 2 to extensions 20 and 21 respectively.



Base containing Power Unit, Distribution Unit & Processor Unit

Frame 2A with 3 Add-on Units



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Power Unit; Farnell.



Power Unit; T.M.C.

3. Processor Unit (Ensign Processor Unit 1A1/SA 20301)

The processor unit is fitted below the power and distribution units. The lower edge is slotted into a base recess and the top edge is fixed by a screw in both of the top corners.

The unit is designed to control the Ensign system up to its maximum size. It is a double sided P C B connected to the remainder of the system via a 60-way connector and ribbon cable.

All the scan and control functions of the extensions and exchange lines are performed by the unit and it monitors the progress of calls through the system. It controls the signalling to and from the interface boards, communicating with the custom IC's via a serial data highway.

The unit contains the following circuit elements: a micro-processor, memory parallelto-serial and serial-to-parallel converters, tone generators for dial tone, ring tone, N.U. tone, a ringing current generator, and a crosspoint matrix.

Test points for measuring the system voltages are located on the bottom right hand corner of the unit.

Two 250mA fuses are mounted on the bottom of the unit and protect the 25Hz ringing supply to the extensions. Replacements are fuses 73/0.25.

A rechargeable ni-cad battery, located at the bottom of the unit, is used to maintain the information in each extension's repertory dialling store in the event of mains power failure. An adjacent link, labelled LKF, can be removed to disconnect the battery.



Bottom right hand corner of processor board, showing ringing supply fuses and voltage test points.

4. 2 + 4 Interface Unit (Ensign 2 + 4 Unit 1A1/SA 20304)

The 2 + 4 unit is a double sided P C B that takes up the whole of the rear swing out gate, Frame 1A. The unit is clipped into the Frame 1A with the four base pegs located in each corner hole, so that the six clips engage over the edge of the P C B.

The Unit provides the terminating facilities for up to two exchange lines and four extensions.

5. Switch Unit (Ensign Switch Unit 1A1/SA 20303)

The switch unit is fixed to the front swing out gate, Frame 2A, by two selftapping screws.

The unit has a row of miniature switches which are used to configure the system, i.e. determine the facilities of each extension.

The system L E D is mounted on the right-hand side of the switch unit and it indicates the state of the system, i.e. running, parked or faulty.

Immediately to the left of the system L E D is the Run/Park switch, which is used to bring the system in to, and out of service for maintenance or re-configuring.

The first module of switches to the left of the RUN/PARK switch is used to set the system for the number of exchange lines connected to it, and for the type of ringing used on these lines. This module of switches is known as the System Switch.



When a larger system than 2 + 4 is required, up to three add-on units may be fitted to the outer swing-out panel to provide the interfaces for extra extensions and exchange lines.

All the units available are fitted in position by locating holes in each of the corners onto pegs on the swing-out panel. Clips then engage over the edge of the P C B to retain the unit in position. It is necessary to remove the switch unit to allow the two lower cards to be fitted.

The types of add-on units available are:-

1. Exchange Line Unit (Ensign E/L 2 + 0 Unit 1A1/SA 20306)

The E/L 2 + 0 provides the terminating facilities for up to two exchange lines.

2. Extension Unit (Ensign 0 + 2 Unit 1A1/SA 20305)

This unit provides the terminating facilities for up to two extensions. The extensions can be either 2W or 4W, or one of each.

3. E/L and Extension Unit (Ensign 1 + 1 Unit 1A1/SA 20308)

This unit provides the terminating facilities for one exchange line and one 2w or 4w extension, thus allowing odd numbers of lines and extensions to be fitted to a system. Only one of these units can be fitted to a system.

Connecting Cables Used Within the Control Cabinet

All the units within the control cabinet are interconnected by ribbon cables. Most of the cables are terminated on a plug at one end with permanent connection to a P C B at the other. The illustrations on pages 12 and 14 show the arrangement of the cables and how to disconnect or reconnect the plugs.

There are two cables which are terminated on plugs at both ends and therefore can be changed without changing a P C B. They are:—

1. Ensign Cable Connexion No. 1A

This cable connects the Distribution Unit to the three add-on units which can be fitted on the Frame 2A.

2. Ensign Cable Connexion No. 2A

This cable connects the Processor Unit to the 2 + 4 Interface Unit and also to the three add-on units which can be fitted on the Frame 2A.

When cables are plugged into or unplugged from P C B's, care should be taken to avoid straining and flexing the P C B which can cause the circuit tracks to break.

REMEMBER – The mains power must be off before moving any cables.

MAINTENANCE KITS AND MAINTENANCE SPARES

4.5.

Each Area will hold 'Ensign' Maintenance Kits located at suitable central points. The kits consist of the following:-

Carrying case	
Ensign Processor and Tone Unit	1A1/SA 20301
Ensign Power Unit	1A1/SA 20302
Ensign Switch Unit	1A1/SA 20303
Ensign 2 + 4 Unit	1A1/SA 20304
Ensign 0 + 2 Unit	1A1/SA 20305
Ensign E/L2 + 0 Unit	1A1/SA 20306
Ensign E/L Extn 1 + 1 Unit	1A1/SA 20308
Ensign Dist. Unit	1A1/SA 20309
Ensign Cable Connexion	No. 1A (Add on distribution)
Ensign Cable Connexion	No. 2A (Highways and control)
Ensign Cord Connexion	No. 1A (Mains lead)

The following items should be held at a central point within the Area or Region and be available for maintenance spares:-

Ensign Base	No. 1A
Ensign Cover	No. 1A
Ensign Frame	No. 1A
Ensign Frame	No. 2A

The maintenance kit provides a supply of spare parts to be used in conjunction with the Faulting Table. When the faulty part in the control unit has been identified the system should be left working using the spare from the maintenance kit.

The section stock will "maintenance exchange" the faulty unit which should be wrapped in the packing of the replacement unit before being handed to the storeman. Tie-on fault labels should be attached to all faulty units and completed in full. An example of the special Ensign fault label is illustrated overleaf, but when stocks of it are exhausted the general purpose label, ES1-8807(R) should be used.

Correctly completed fault labels will help to quickly identify any weakness in design or production. If large numbers of items are returned for repair, but faults are not apparent when they are tested, then analysis of the fault labels may lead to design faults being detected. Although the Ensign system has been tested on most types of public exchange, it is not possible to test the equipment under all environmental conditions.

Where possible, the replacement units should be tested before being put into the maintenance kit to guard against the chance of new units being faulty when issued.

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FAULTY EQUIPMEN ENGINEERING	NT REPORT	NSIGN	
PLEASE COMPLETE T STOCK CONTROL AND	HIS FORM ACCURATELY, ALL THE INFORMAT D/ OR FAULT STATISTICS. THANK YOU ENSIGN DE	ION IS REQUIRED FOR	
PART 1	FAULT REPORT	TO BE COMPLETED	
ITEM TITLE	SWITCH UNIT IAI SAZO?	So3_FINDING FAULT	
NUMBER:	02/82SEF	RIAL OR WEEK NUMBER	
FROM REGION-	MIDLAND		
FROM AREA:	NEST MIDLAND		
CUSTOMER		· · · · · · · · · · · · · · · · · · ·	
TYPE OF ENGINEER:-	INOT OR MAINT (DELETE AS APPROPRIATE)	IF KNOWN	
DESCRIPTION OF OBSERVED FAULT:- DESCRIBE EFFECT, ONLY GIVE CAUSE IF KNOWN. 000 OR FAULTY ARE NOT ACCEPTABLE SYSTEM LED BROKEN			
HIT E	34 COVER WHEN TH	IE	
COVER 1	NAS BEING REMON	ED	
FROM	CONTROL CABINET.		
PART 2	FAULT CLEAR	TO BE COMPLETED BY REPAIR ENGINEER	
	CUT		
ENSIGN DEVELOPMENT GROUP (FAULTS) ROOM 662 100-110 HIGH HOLBORN			
LUNDON WC1	νοιυ	FORM PD 121-9050 12	

Fig. 21. Ensign Fault Label

4.6. HANDLING OF CONTROL CABINET EQUIPMENT

Ensign equipment is robust in construction but care should be taken when handling field replaceable units to avoid damage, particularly when fitting or removing them from equipment frames. Wherever possible bodily contact with the tracks on the units and components should be avoided as this will lessen the chance of damage to components through electrostatic discharge.

Great care must be exercised when inserting and removing ribbon cable plugs to and from the unit connectors, because too much pressure will cause the circuit board units to bend and break the printed circuit tracks. The circuit board should be supported with the free hand when plugs are inserted or removed.

For fault free operation it is essential that all plugs are fully inserted and the retaining clips are placed in their locked position. As a plug is inserted, the retaining clips will move inwards towards the locked position, but they will not be locked until they are pushed towards each other fully by a separate final movement. To remove a plug from the unit connectors the handles of the retaining clips are moved outwards from the centre to automatically eject the plug from the connector, (see fig. 5 on page 14).

The smaller ribbon cable plugs are not fitted with locking clips.

4.7. LIGHTNING PROTECTION

Ensign has been designed to withstand transient voltages on its lines but in areas of known high risk or sites with a history of lightning damage additional protection may be provided.

Where the incoming external lines enter at a remote point and are then run via internal cabling to the Distribution Unit, Lightning Protection should be provided at the point where the external cables are terminated with the internal wiring, or near the point of cable entry. Where however, the incoming external lines would normally enter the control cabinet directly, then Lightning Protection may be provided in an additional Boxes Connexion fitted adjacent to the control cabinet.

All cases of lightning damage should be recorded and reported on Form A.646.
4.8 **POWER FAIL ARRANGEMENTS**

No provision is made for standby power to maintain the operation of the system if the mains power supply fails. Arrangements are made however, to give extensions 20 and 21 access to exchange lines 1 and 2 respectively.

Figure 22 (on page 109) illustrates the switching of the exchange lines to the extensions. The relays and wiring are fitted on the Distribution Unit. The ringing detector remains in the circuit to provide call information to the processor to prevent it disturbing any calls that are in progress when the power is restored.

If extensions 20 and 21 are fitted with 2-wire telephones, or special 'power fail' 4-wire telephones, both i/c and o/g calls can be made from them under power fail conditions. If standard 4W telephones are fitted, however, it will only be possible to receive i/c calls, since dialling information is normally transmitted over the data pair to the control cabinet.

Maintenance engineers should be aware that a short delay of a few seconds will occur when power is first applied before the telephones may be used. This delay is caused by the system running a complete cyclic check. If the supply from the Power Unit is continually interrupted or is very noisy the cyclic check will never be completed and the system will remain inoperative i.e. in the Power Failure fall-back condition.

Each extension has a ten number repertory dialling store and the memories for these are maintained during mains power failure by a rechargeable ni-cad battery fitted on the Processor Unit. The battery is normally trickle-charged from the +5 volt supply and has a capacity to maintain the memory for up to 3 weeks. The battery's service life should be in excess of 5 years.





WHENEVER A UNIT IS REPLACED THE SYSTEM MUST FIRST BE PARKED UNTIL THE LED EXTINGUISHES. THE POWER MUST THEN BE DISCONNECTED. THE UNIT MAY THEN BE REPLACED AND THE POWER RESTORED. FINALLY THE RUN/PARK SWITCH MUST BE RESTORED TO THE RUN POSITION AFTER OBSERVING THAT THE LED IS PERMANENTLY ON WHILST IN PARK. THIS INDI-CATES THAT THE PROCESSOR IS FUNCTIONING AND WAITING TO RUN.

PART 1 – COMMON EQUIPMENT TESTS

These tests must be performed in numerical order.

TEST No.1/1 - Power Supplies

Ensure that the mains supply is connected and that the PSU cable is plugged into the processor unit.

Switch the RUN/PARK switch to the PARK position and wait until the system becomes free; this is indicated by the system LED extinguishing.

Measure the voltage rails on the test points provided on the processor unit adjacent to the PSU socket with a Meter Multirange No. 12. The voltages should be within the limits stated measured relative to the 0 Volts test point.

Nominal Voltage	-50.0	+40.0	0.0	+5.00	-12.0	+5.00	+1.50	+12.0
— Max.	-55.0	+44.0	0.0	+5.25	-12.6	+5.25	+1.65	+12.6
l olerance — Min.	-45.0	+36.0	0.0	+4.75	-11.4	+4.75	+1.35	+11.4

ALL SUPPLIES DEAD

Check mains fuse in plug (3A), replace if blown. On T.M.C. Power units only, check input fuse (1.6A), replace if blown. If supplies still dead, check that mains supply is present. If mains supply is satisfactory, replace the PSU & repeat test 1/1.

ONE OR MORE SUPPLIES OUT OF TOLERANCE, OR A READING OTHER THAN ZERO. ON THE 0 VOLT TAG.

Replace the P.S.U. and repeat test 1/1.

If the voltages are still out of tolerance the fault is probably in the processor unit or one of the interface units.

The following units should be replaced in the stated order until the fault is cleared:

- 1. Processor unit
- 2. 2 + 4 unit
- 3. Add-on interface units.
- 4. Ensign Cable Connection No. 2A.

TEST No. 1/2 – Processor

Ensure that the system is parked, disconnect the mains supply and then reconnect approximately 5 seconds later.

LED PERMANENTLY ON WHEN POWER RESTORED

Proceed to Test 1/3. The processor is running and is ready to process calls.

LED FLASHES WITH ANY CADENCE, OR DOES NOT LIGHT

This indicates that the processor is not running. The fault may be due to the processor or the switch unit.

Replace the processor and then repeat test 1/2.

If the fault still exists – Replace the switch unit and then repeat test 1/2.

TEST No. 1/3 – Processor and Configuration

Switch the RUN/PARK switch to the RUN position and observe the flashing sequence of the system LED. (The system will perform self diagnostic and configuration tests which may take up to 30 seconds before any flashing sequence is displayed).

L.E.D. SEQUENCE FLASHES TWICE A SECOND WITH EQUAL ON AND OFF PERIODS

Proceed to Test 1/4. The diagnostic tests have not detected any faults.

L.E.D. SEQUENCE IS A SHORT ON AND LONG OFF

This indicates a configuration error.

Check that the switch settings on the switch unit correspond to valid extension packs for the number of lines set on the system switch, that sufficient exchange lines cards are provided and that they are fitted in the correct position. If any units are changed or re-arranged repeat from test 1/2. If any switch settings are altered move the RUN/PARK switch to PARK and then back again to RUN to make the new settings effective. Repeat test 1/3.

L.E.D. SEQUENCE IS A LONG ON AND A SHORT OFF

This indicates that the diagnostics have identified a memory or processor fault.

Replace the processor unit and repeat tests from test 1/2.

L.E.D. REMAINS STEADY OR GOES OUT

This indicates a major processor unit failure.

Replace the processor unit and repeat tests from test 1/2.

TEST No. 1/4 - Tones

Lift the handset at a working telephone and listen to dial tone.

Dial the extension number of the extension being tested to check the engaged tone.

Clear to regain dial tone and then dial 8 to check NU tone.

Clear to regain dial tone and then dial a valid extension number to check return ringing tone.

ONE OR MORE TONES ARE MISSING OR INCORRECT

This indicates that the tone circuitry is probably functioning incorrectly on the processor unit, or that an extension unit or the Ensign ribbon cable No. 2A are faulty.

Check that the faulty tones are missing at all telephones on the system.

If so, replace the processor unit and repeat tests from test 1/2. If the tones are missing from a group of extensions common to one extension unit, replace that unit and repeat the test 1/4.

If fault still persists – The Ensign ribbon cable 2A should be replaced.

Repeat the test 1/4.

TEST No. 1/5 - Ringing Supply

Call one or more valid extensions having a correctly functioning tone caller or bell.

TONE CALLER OR BELL NOT OPERATING CORRECTLY ON ALL EXTENSIONS

This indicates that the ringing supply is probably faulty on the processor unit. Check 250 mA ringing supply fuses on processor unit. Replace if blown.

If fault still persists – Replace the processor unit and repeat from test 1/2.

TONE CALLER OR BELL NOT OPERATING CORRECTLY ON A GROUP OF EXTENSIONS COMMON TO ONE EXTENSION UNIT

This indicates that the ringing supply is probably faulty on the extension unit.

Replace the extension unit and repeat from test 1/4.

If the fault still persists – Replace the Ensign ribbon cable 2A.

Repeat from test 1/4.

PART 2 – EXTENSION INTERFACE UNIT AND TELEPHONE TESTS

TEST No. 2/1 - Dial Tone

Lift handset of suspect telephone and check that the system returns dial tone.

NO SIDETONE OR DIAL TONE HEARD IN TELEPHONE EARPIECE

Check the distribution wiring connections and repeat test 2/1.

If fault still persists – Replace telephone and repeat test 2/1.

If fault still persists – Replace extension interface unit and repeat test 2/1.

If fault still persists – Check that the port switch setting for that extension is correct and reset if necessary. If any switch settings are altered move the RUN/ PARK switch to PARK and then back again to RUN to make the new settings effective.

Repeat test 2/1.

If fault still persists – Replace Ensign Cable No. 2A and repeat test 2/1.

If fault still persists – Change distribution unit.

SIDETONE, BUT NO DIAL TONE HEARD IN TELEPHONE EARPIECE

Check that the port switch setting for that extension is correct and reset if necessary. If any switch settings are altered move the RUN/PARK switch to PARK and then back again to RUN to make the new settings effective.

Repeat test 2/1.

ANY OTHER TONE IS HEARD IN TELEPHONE EARPIECE

Replace extension interface unit and repeat test 2/1.

Fault still persists – Replace Ensign ribbon cable No. 2A and repeat test 2/1.

TEST No. 2/2 – Dialling

Whilst listening to Dial Tone, key (or dial) 8 and check that N.U. tone is returned.

DIAL TONE NOT BROKEN

Replace Telephone and repeat test 2/2.

If fault still persists – Replace Extension Interface Unit and repeat test 2/1.

ANY OTHER TONE IS HEARD

Replace Extension Interface Unit and repeat test 2/1.

If fault still persists – Replace telephone and repeat test 2/2.

TEST No. 2/3 - I/C Ringing

Ring telephone from another extension telephone to check that bell or tone caller operates correctly.

NO RINGING OR TONE CALLING

Replace telephone and repeat test 2/3.

If fault still persists - Replace Extension Interface Unit and repeat test 2/1.

TEST No. 2/4 – 4 Wire Telephone Functions

This test applies to 4W telephones only. Press Monitor or Call/Clear button and check that the associated LED lights. This checks data signalling to and from the extension telephone and -50v dc supply for the LED's.

LED DOES NOT LIGHT

Restore the button and then repeat test 2/4. This checks whether the fault was due to a signalling error on the data line.

If fault persists – Replace telephone and repeat test 2/4.

If fault persists – Check the data pair by listening for the data signal with a 'H.A.T.' tester or test telephone.

If satisfactory and the fault persists – Replace the Extension Interface Unit and repeat from test 2/1.

TEST No. 3/1 – Parent Exchange.

Confirm that the Parent exchange is working correctly by parking Ensign and connecting a test telephone across the line to ensure that Dial Tone from the parent exchange is returned and that the telephone may dial valid numbers.

If the line or parent exchange is faulty, localise fault or report it to 151 fault control.

TEST No. 3/2 - Dial Tone

Check that RUN/PARK switch is set to RUN and select the suspect line by dial 9 access or line button access as appropriate to system configuration. The correct line can be accessed by removing all other lines from the dial 9 group temporarily to ensure only faulty line is selected. Ensure that switches are reset after test, and note that the RUN/PARK switch must be reset from park to run to make the change effective.

NO DIAL TONE IS HEARD

This indicates that the Exchange Line Interface Unit is faulty.

Replace Exchange Line Interface Unit and repeat test 3/2.

TEST No. 3/3 – Dialling

Seize suspect line and dial a test number to test signalling from Ensign.

EXCHANGE EITHER RETURNS AN INCORRECT NUMBER OR FAILS TO BREAK DIAL TONE.

This indicates a signalling fault in Exchange Line Interface Unit.

Check that the port switches for that line are correctly set for the type of signalling, (loop Dis or MF4) if not, reset correctly and repeat test 3/2.

If any switch settings are altered move the system switch to PARK and then back again to RUN to make the new settings effective.

If fault still persists – Replace Exchange Line Interface Unit and repeat test 3/2.

TEST No. 3/4 - Recall

If the Ensign System is connected to an exchange or PBX which offers supplementary facilites, set up an exchange or PBX call. On Ensign telephones press the recall button "R". On 2 wire telephone press the hold button and then dial 40.

PARENT EXCHANGE RETURNS DIAL TONE

If possible, test a supplementary facility, and if faulty report the fault in the exchange to 151 fault control.

If satisfactory proceed to test 3/5.

DIAL TONE IS NOT RETURNED.

Check that the port switches for that line are set for the correct type of recall signal; (Earth or Register). If not, set the switches correctly and repeat test 3/4. If any switch settings are altered move the RUN/PARK switch to PARK and then back again to RUN to make the new settings effective.

If switches are correctly set and fault persists – Replace Exchange Line Interface Unit and repeat from test 3/2.

TEST No. 3/5 – I/C Ringing.

Set up an incoming call into the suspect external line to check that Ensign detects ringing.

SYSTEM DOES NOT RESPOND TO INCOMING RINGING.

Check that at least one extension is set for incoming access on the suspect line. If not, set the switches correctly and repeat test 3/5. If any system settings are altered move the RUN/PARK switch to PARK and then back again to RUN to make the new settings effective.

Fault still persists – Replace Exchange Line Interface Unit and repeat from test 3/2.

IF, AFTER CARRYING OUT ANY OF THE SEQUENCE OF TESTS SHOWN ON THE PREVIOUS PAGES, THE SYSTEM WILL STILL NOT FUNCTION, THEN ALL THE UNITS AND CONNECTING CABLES IN THE CONTROL CABINET SHOULD BE REPLACED.

PERSONAL NOTES

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