LEVELTEC
communications

SL 1000 Compact
System Manual

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Ver. 20130903

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Table of contents **Page**

1 GENERAL 4

2 SYSTEM STRUCTURE 5

2.1 Central unit 5

2.1.1 Technical specifications 5
2.1.2 General 6
2.1.3 Standard parts of the central 7
2.1.3.1 Power supply unit 7
2.1.3.2 Processor card 9
2.1.3.3 Connection card for the terminal 9

2.1.4 Optional parts of the central 10
2.1.4.1 Extension card for the optional bus 10
2.1.4.2 Real time clock 10
2.1.4.3 Relay card 10
2.1.4.4 Serial communication card 10

2.2 Cable network 10

2.3 Terminals ans Special connection Units 11
2.3.1 General 11
2.3.2 Terminal models 12
2.3.3 Special connection untis 14

3. INSTALLATION, CONNECTING AND TAKING INTO USE 15

3.1 Installation 15
3.1.1 Contents of delivery 15
3.1.2 Installation schemes and requirements 15

3.2 Connecting of the Units 17
3.2.1 The connection cards 17
3.2.2 The user terminals 17
3.2.3 The programming terminal and the maintenance terminal 18
3.2.4 The relay card 18
3.2.5 The real time clock 18
3.2.6 The serial communication card 19

3.3 Taking into use 19

4 FAULTFINDING 20

5 SYSTEM FUNCTIONS 24

5.1 Basic functions 24
5.2 Special Functions and Features of the Terminals 28
5.3 Group Calls 31
5.4 Blocking of Calls 31

6 USER PROGRAMMING OF THE SYSTEM 32

6.1 Programmable Functions and System Definition Diagram 32
6.1.1 The free numbers 32
6.1.2 The type of the terminals 33
6.1.3 The group calls 33
6.1.4 The short code numbers and the transfer numbers 33
6.1.5 The special features of the terminals 34
6.1.6 The blockings 34
6.1.7 The relays 35
6.1.8 The time 35
The system definition diagram 36

6.2 Programming Instructions and Programming Diagram 37
6.2.1 Programming the free numbers 38
6.2.2 Programming the type of terminal 39
6.2.3 Programming the group calls 39
6.2.4 Programming the short code and transfer numbers 40
6.2.5 Programming the special features of the terminals 40
6.2.6 Programming the blockings 42
6.2.7 Programming the relays 42
6.2.8 Programming the time 42
6.2.9 Clearing of all programming 43
The programming diagram 44

6.3 Programming Examples 45

7 INSTRUCTIONS FOR USE 49-53

System Definition Diagram 54-55
Programming Diagram 56-57

1. GENERAL

The SL 1000 Compact multicom system is an advanced multipurpose intercom system with a maximum size of 32 terminals and with 3 two-way speech channels and 1 one-way music channel. In addition to handling the speech communication between any two user terminals, the system can transmit numeric messages from one terminal to another, using the 4-digit display unit which some of the terminal models have. The display unit tells which terminal number you are in contact with, the time of the day, stored call requests and programmed information codes, which, for instance, tell the expected time of return or the reason for absence. Thanks to the possibility of storing information codes and leaving call requests, the system serves the user also in cases where the normal telephone or a standard intercom do not, that is when the person sought for is busy or not present. Because the probability for this can be very high, in certain types of organizations even 70 %, the SL 1000 Compact system increases the efficiency of your work and gives you more undisturbed working time than any traditional system.

The SL 1000 Compact system replaces, as it is, partly or in whole several such systems that usually are bought separately, fir instance messenger call systems, nurse call systems, gate/door station systems, absence registration systems, public address (PA)/program distribution systems and audible paging systems with answer back possibility. Using the serial communication card of the system a peripheral device such as a monitor or a printer can be connected, or the system can be coupled to another system, such as a wireless paging system or a system for flexible working time registration. A relay can also be used to control e.g. video cameras or electrical door locks, and in this way a more efficient integrated total solution can be found to fulfill the internal communication and surveillance needs of most organizations.

The heart of the SL 1000 Compact system is a fully electronic microprocessor controlled central unit. The system functions are based on a program stored into the memory of the central, so the modifying of the functions or the adding of some special features do not usually require any additional electronics, but only the exchanging of the memory chips. Only the relay functions and the serial communication to a peripheral device or another system need additional cards. In addition to those there is a real time clock card, with the help of which the system clock keeps the time also during power breaks, which the standard clock does not.

A big number of special functions and features are included in the standard program, such as free numbering of the terminals, determining the members of the group calls, giving the priority right to desired terminals, and defining of blockings, i.e. which terminal are not allowed to call certain other terminals. These can all be defined or connected on or off at the customer's and even by the customer. This user programming does not require any special equipment but is done using a normal desk terminal of the system, which for the duration of the programming session is connected to the programming connector of the central. All programming performed is stored into non-volatile memory, which retains its contents even during power breaks. The user programmability of the SL 1000 Compact system makes it very flexible and modifiable according to the needs of the customer.

2. SYSTEM STRUCTURE

The system consists of the following main parts, see figure 1:

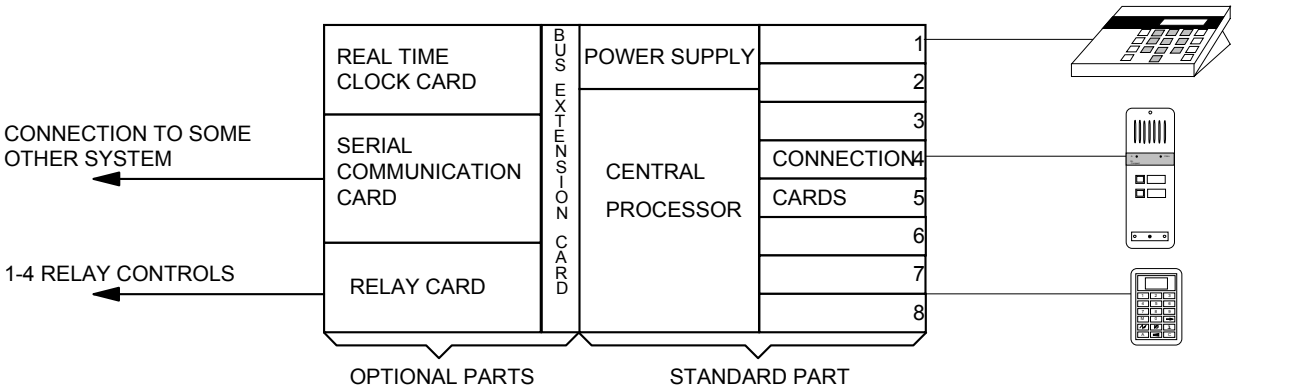


FIGURE 1

- *A central unit*, which always includes a power supply unit. a processor card, which also functions as the mother board for the connection cards, and the required amount (1-8) *of connection cards*, to each of which 4 terminals can be connected.

The optional cards of the central, of which one can be connected without the optional extension card and all three with it, are *the real time clock card*, *the serial communication card* and *the relay card*, which has 4 relays.

- *A cable network*, which interconnects the central and the terminals. The network is a standard star-formed network, where each terminal is connected to the central with its own two-twisted pairs. Both the powering of the terminals and the two-way speech communication and two-way data transmission are done via these 4 wires.

- *Terminals*, through which the users communicate. There are several different models for different needs and environments. The most important terminal model is the desk top model with display, intended for office-type use

2.1 THE CENTRAL UNIT

2.1.1 TECHNICAL SPECIFICATIONS

Environment conditions		
	temperature	0 °C - 45 °C (32 ºF - 113 ºF)
	relative humidity	20 - 80 %
Mechanical dimensions (mm)		
	Central cabinet:	
	Height	275
	Width	520
	Depth	110
	Connection cards	71x192
	Optional cards	51x84
	Extension card for the optional cards	65x69
Weight	central cabinet without connection cards	6,5 kg (14,3 lb.)
	with connection cards	9,3 kg (20,5 lb.)
Mains supply		110/220/240 V AC, 50 - 60 Hz, 100 W

Length of detachable mains cable	2 m
Smallest central size	4 terminals
Expansion step	4 terminals
Maximum central size	32 terminals
Number of speech channels and listening channels	3/1 or 2/3
Cable type between central and terminal	MHS 1x4x0,5 or equivalent
Maximum cable length (loop resistance 200 ohm)	1 km (3300 ft)
Frequency response	250 - 6000 Hz ± 3 dB
Transmission level in both directions	0 dBm
Switching field	electronic (analog switch matrix)
Storing of user programming	non-volatile EEPROM memory
The calling numbers of the terminals	10-41 or freely programmable (2-, 3- or 4-digits long numbers)

2.1.2 GENERAL

The central unit of the SL 1000 Compact system is intended for wall-mounting and is 275 mm high, 520 mm wide and 110 mm deep. The cover of the central cabinet is removable, and the mounting plate fastened to the back side of the cabinet holds a power supply unit (PSU) at the left end and the processor cards (PRO-C), which also functions as the back board but or mother board for the connection cards (CC-4), see figure 2.

The central can have 1-8 connection cards installed, and as to each of these up to 4 terminals can be connected, the maximum size of the Compact system is 32 terminals. A radio unit or some other type of program source can be connected to one or several connection numbers via a special interface unit, in which case the maximum number of terminals is decreased.

The central has 3 two-way speech channels, so 6 terminals can simultaneously communicate with each other pairwise. Additionally there is one one-way channel, which can be used as a listening channel for a radio or some other program source. All terminals in the system can be listening to this program channel at the same time. If 2 or 3 program sources are included in the system, the number of speech channels drops to 2.

The central is fully electronic and the speech connections are based on an analog matrix controlled by the processor. The signalling, or data transmission, between the processor and the terminals is handled via a current loop. The signalling includes reading the buttons depressed as the terminals, turning the LEDs of the terminals on and off, and sending numbers to the display of the terminals.

Three types of optional cards can be installed into the central besides the connection cards for the terminals: A real time clock card (RTC) with battery back-up, which keeps the system clock running during power breaks, a serial communication card (SCC), which is needed for controlling a CRT-terminal or a printer, or when the Compact system is connected to some other type of system, and a relay card (RC-4) with 4 relays, which can be used to control e.g. CCTV cameras or electrical door locks. If more than one optional card (OPT BUS) is additionally needed, which extends the bus for the optional cards, so that all 3 optional cards can be connected.

The Compact system will, after connecting power on for the first time, function in its basic mode, without the customer having to do anything else than setting the time of day to the system clock. The connection numbers for the terminals are then 10-41. The numbers can, however, be freely programmed to be in one of the ranges 00-99, 000-999 or 0000-9999. A lot of other special features and functions can also be programmed by the user, such as group calls, call blockings, priority rights, relay controls, etc. All these user programmings, as well as the short code numbers, transfer addresses, call request numbers, information codes and alarm time settings if the individual terminals, are stored in the non-volatile EEPROM memory of the processor card, so they are retained also past power breaks.

2.1.3 THE STANDARD PARTS OF THE CENTRAL

The functional standard parts of the central are the power supply unit, the processor card and the connection cards for four terminals.

2.1.3.1 THE POWER SUPPLY UNIT PSU

The power supply unit, which is built into the central cabinet, consist of a mains inlet connector, a mains transformer, a rectifying/prefiltering card and a regulating/postfiltering part.

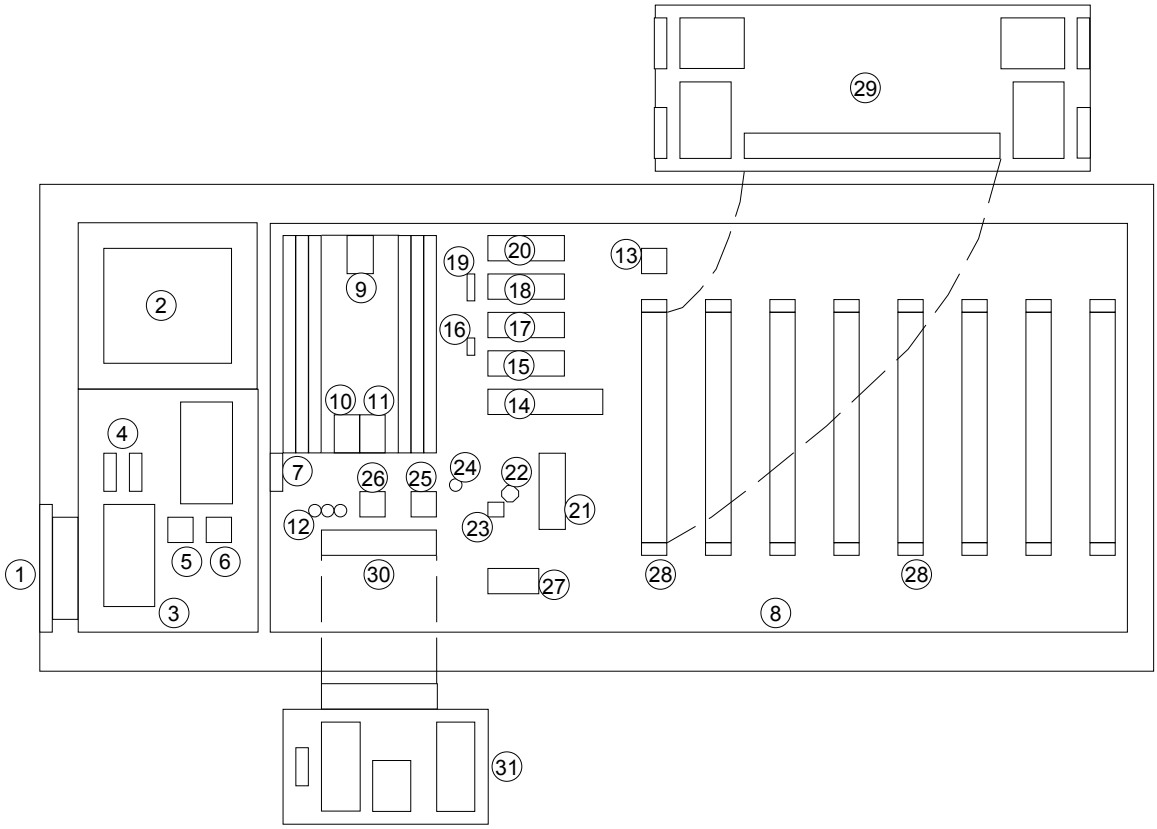
The mains inlet socket is on the left and side plate of the cabinet. The two primary fuses are located inside the socket, so the replacement of the fuses can take place without removing the cover of the cabinet. The fuse type is T2A with a mains voltage of 110 V AC, T1A with a mains voltage of 220 V AC or 240 V AC.

The mains transformer located in the upper left corner of the cabinet is constructed to accept 110, 220 or 240 V AC at 50/60 Hz. The mains input voltage is selected with soldered jumpers at the primary winding.

Below the transformer the power supply unit card (PSU-C) is located. It includes the rectifiers, the filtering capacitors and the two secondary fuses of type T1,6A. The card is fastened to the mounting plate of the cabinet with the bolts of the two filtering capacitors. The output voltages of the card are +30 V, +10 V and -10 V, which together with the ground voltage are passed to the processor card via a 4-pin connector for regulation and postfiltering.

The left upper corner of the processor card holds the remaining part of the power supply unit. In this part the -30 V voltage is stabilized for the use as supply voltage for the terminals. The +21 V needed as programming voltage for the EEPROM and the +7,5 V needed as reference voltage on the connection cards are also made from the +30 V. The +5 V and -5 V needed by the logic and analog circuitry are regulated from the +10 V and -10 V.

The +5 V and -5 V regulators (7805 and 7905) and the stabilizing transistor (TIP 121) for the +30 V are mounted on the cooling profile. The postfiltering capacitors are located below and to the right of the profile. The components for generating the voltages +21 V and +7,5 V, including the trimming potentiometer for the +21 V, can be found above the connectors for the two first connection cards. Below the cooling profile there are three LED indicators, from which the presence of the voltages -30 V, +5 V and -5 V can be checked.



1. Mains connector with primary fuses (2 pcs)
2. Transformator 110/220/240 V AC, 100 W
3. Power Supply unit card PSU-C
4. Secondary fuses (2 x T1,6 A)
5. Rectifier (+ 30 V)
6. Rectifier (+10 V, -10 V)
7. Connection between PSU-C and PRO-C cards
8. Processori card PRO-C
9. +30 V stabilizing transistor (TIP121)
10. +5 V voltage regulator (7805)
11. -5 V voltage regulator (7905)
12. LED indicators for +30 V, +5 V, -5 V
13. +21 V trimming potentiometer
14. CPU (8085A)
15. EPROM (27128/27256)
16. Jumper if type of (15) = 27256
17. EPROM (2764/27128)
18. EEPROM (2817/2817A)
19. Jumpers for selection of EEPROM type:

20. RAM (TC 5564/5565)
21. I/O-interface circuit (8155)
22. 2 MHz clock adjustment
23. RESET-button
24. RESET LED
25. TRAP level trimming potentiometer
26. RESET level trimming potentiometer
27. Programming terminal connector
28. Connectors for the 1-8 connection cards
29. Connection cards (CC-4)
30. Connector for the optional cards
31. Optional card (RTC, RC-4, SCC)

2.1.3.2 THE PROCESSOR CARD PRO-C

The processor card also functions as the back board or mother board for the connection cards, so it is equipped with eight 32-pin connectors, on the connection card bus. In the lower left corner of the processor card there is an additional 32-pin connector of a shorter type for the connection of the optional cards. There is also a 4-pin connector marked "DESIGN", to which a standard desk terminal with display can be connected for the user programming of the system.

The processor circuitry consists of the CPU (microprocessor 8085A), EPROM program memory (two chips, one type 27128 or 27256, one type of 2764 or 27128, so the program memory size is 8-48 kbytes), RAM data memory (TC 5564 or 5565 of 8 kbytes), non-volatile EEPROM data memory (2817 or 2817A of 2 kbytes), the I/O and timer circuit (8155), and the discrete components.

Three of the components are adjustable: two trimming potentiometers for adjusting the RESET and TRAP levels of the CPU and one trimming capacitor for adjusting the 2 MHz clock frequency. These are all adjusted at the factory and need normally not to be touched.

The program is automatically started when power is connected to the central. With the RESET button on the processor card the program can be started from the beginning if needed. The RESET LED is lit when the CPU is in the RESET state.

All data transmission from the processor to the user terminals and vice versa goes via the I/O interface circuit 8155 and the connection cards. The processor keeps scanning the terminals to read the keys depressed, and sends data to the 4 LEDs and the 4-digit numeric display of the terminals. The control of the analog connection matrix on the connection cards is also handled by the processor via the 8155. The state of the switches in the matrix determine which terminals are in speech connection with each other and in which speech channel..

2.1.3.3 THE CONNECTION CARD CC-4 FOR THE TERMINALS

On the processor back board card there are connectors for 1-8 connection cards (CC-4, Connection Card), to each of which 4 user terminals can be connected, the maximum capacity of the Compact central thus being 32 terminals.

Instead of any terminal one can connect a program source (radio, tape recorder, etc.) via an AIC-unit (Audio Input Connection Unit), or an amplifier with loudspeakers for announcement purposes via an AOC-R-unit (Audio Output Connection Unit with Relay).

The terminals or the special audio interface units are connected to the connection cards using 4-pin connectors, meaning that replacing a connection card or moving a terminal from one connection number to another is very easy. The physical connection numbers, which also are the initial values of the calling numbers for the terminals, are 10-41, but these can very easily be altered from the programming terminal. All programmed terminal numbers must be of the same length, 2-, 3- or 4-digits long.

The functional parts of the connection card are the connection matrix, the interface circuitry for the terminals, and the decoding logic. The connection matrix consists of 8 rows and a maximum of 64 columns (each connection cards adds 8 columns to the matrix). Each terminal needs 2 columns, one for the incoming and one for the outgoing speech signal. The terminals are via the interface circuitry connected to these two columns. One of the 8 rows is needed for the 488 Hz tone signal, from which the call connection, alarm, busy, etc. tone signals are generated. Two rows are needed for one speech channel, that is one row for each direction. Of the 7 rows left 3 two-way speech channels can thus be formed. The remaining row can be used as a one-way listening channel for e.g. music. Each cross point of the rows and columns of the matrix is a CMOS analog switch. The processor connects these switches on and off via the decoding logic, thus determining which terminals are connected to which channels..

Each terminal is connected to the connection card with a 4-wire cable consisting of 2 twisted pairs, the maximum length of which can be about 1 km. One twisted pair (A, B) is used for supplying power to the terminal and for the speech signal going to the terminal, and the other pair (C, D) is for the speech signal coming from the terminal and for the two-way signalling between the terminal and the central. The interface circuitry on the connection card separates these signals from each other.

2.1.4 THE OPTIONAL PARTS OF THE CENTRAL

The optional parts of the central are the extension card for extending the bus for the optional cards, the real time clock card, the relay card and the serial communication card.

2.1.4.1 THE EXTENSION CARD OPT BUS FOR THE OPTIONAL BUS

In the lower left corner of the processor card there is a 32-pin connector, to which one of the three optional cards (the real time clock card, the relay card, the serial communication card) can be connected.

If more than one optional card is to be included in the central, one needs the bus extension card, to which all three optional cards can be connected.

2.1.4.2 THE REAL TIME CLOCK RTC

The Compact system has as standard a software clock, the accuracy of which depends on the 2 MHz clock frequency of the processor. The clock is running only as long as the mains voltage is connected; if a mains break occurs the clock will be cleared and started from 00:00.

The real time clock card has its own battery back-up, so it will keep running also during power breaks, which may be up to about two days long. The battery is, when needed, automatically recharged from the +5 V voltage, the maximum charging time for an empty battery being some 15 hours.

The system automatically knows if the optional clock card is connected or not, and uses the software clock if it isn't.

2.1.4.3 THE RELAY CARD RC-4

There are four relays on the relays card. Each relay has one potential free contact, which is normally open. The maximum contact ratings with resistive loads are maximum voltage 48 V AC, 48 V DC, maximum current 5 A (at 48 V AC or 24 V DC).
With the relay card the Compact central can control external devices, such as CCTV cameras, door locks, etc.

2.1.4.4 THE SERIAL COMMUNICATION CARD SCC

The SCC (= Serial Communication Card) is an asynchronous serial communication interface of the Compact central. The card includes both the RS 232C and 20 mA current loop connections with selectable baud rates. The card is meant for two-way communication with other systems, CRT terminals, printers and so on.

2.2 THE CABLE NETWORK

The cable network is a standard 4-wire star-configuration network of the same type as is used in all telephone installations. Each user terminals is connected to the central with its own two-twisted pairs. The cable type is e.g. MHS 1x4x0,5 or equivalent, where the wire diameter 0,5 mm means that the maximum cable distance between the central and the terminals is about 1 km (3300 ft), based on a maximum loop resistance of 200 ohm.

The star-wiring saves installation costs, because multicables containing several twisted pairs can be used between the central and junction boxes located in different parts of the building. From the junction boxes onwards 2-pair cabling is used for branching to the individual user terminals. Another advantage is, that the Compact central can later be replaced with its big brother, the SL 1000 Mark II central, with a capacity of 8-448 terminals compared with the capacity 4-32 terminals of the Compact central, without altering the existing cable network, but only expanding it. The biggest advantage of a star-formed network over a ring network is, however, that the malfunction of one user terminal or its cable does not prevent the rest of the system from working.

The cabling is terminated at the user terminal end in the desk terminal cases with a 8-pin RJ-45 socket. The wall terminals have a 4-pole screw connector for terminating the cable.

At the central the cables can be connected directly or via a junction box or some other form of intermediate termination. Each 4-wire cable is terminated with a 4-pin screw connector, which then is connected to its corresponding connector on the connection card. No separate cross-connection arrangement is needed, because the screw connectors can easily be moved from one connection card to another when e.g. two users are changing rooms between themselves, or in case of malfunction of a single connection number on the card.

The former case can, however, alternatively be taken care of through user programming, since all individual terminal features, including the number of the terminal, can be transferred to any connection number.

The number of wires required does not depend on the terminal model or features; two pairs are always enough. It is, however, a good habit to provide a little more wires than actually needed during the initial installation, and thus preparing for possible wire damages and future expansions of the system. This extra cabling represents a minor cost increase compared to the cost of adding cables later.

It is of major importance that the twisted pairs are used correctly, since connecting the pairs wrongly can lead to overhearing of the calls or to bad functioning of the speech switching. One pair (A, B or 1, 2) is used for powering the terminal and for feeding the speech signal from the central to the terminal. The other pair (C, D or 3, 4) is used for feeding the speech signal from the terminal to the central and for the two-way data transmission or signalling: From the terminal to the central the pressing of the keys are transmitted, and from the central to the terminal the data for the numeric display and for the LED indicators.

2.3 THE TERMINALS AND THE SPECIAL CONNECTION UNITS

2.3.1 GENERAL

The same types of user terminals and special connection units, which are connected to any connection number of the central, are used in the SL 1000 Compact system as in the bigger SL 1000 Mark II system. There are several terminal models for different purposes and environments.

There are two terminal models with display: the SL 1002 D and the SL 1002 DH which are desk top models for office-type environments, the SL 1008 and the SL 1008 H which are indoor terminals for wall mounting; the H-models have a handset. These models have an 18-key keyboard with 10 number and 8 function buttons, a 4-digit display, and 4 LED indicators, see figure 3 of the desk top model SL 1002 D.

Simpler terminal models, from which the display and part of the buttons and/or LEDs are missing, are the desk top model SL 1001, the door terminal SL 1003 for wall mounting indoors and wall mounted terminals for industry or outdoor use. Completely without buttons are the loudspeaker terminal SL 1011 intended for announcement use and the passive subterminal SL 1013, which has both a loudspeaker and a microphone.

The special connection units are the radio input unit SL 1000 AIC-L/D for connecting a program source to the central, and the audio output unit SL 1000 AOC-RB with a relay for connecting to an amplifier with loudspeakers.

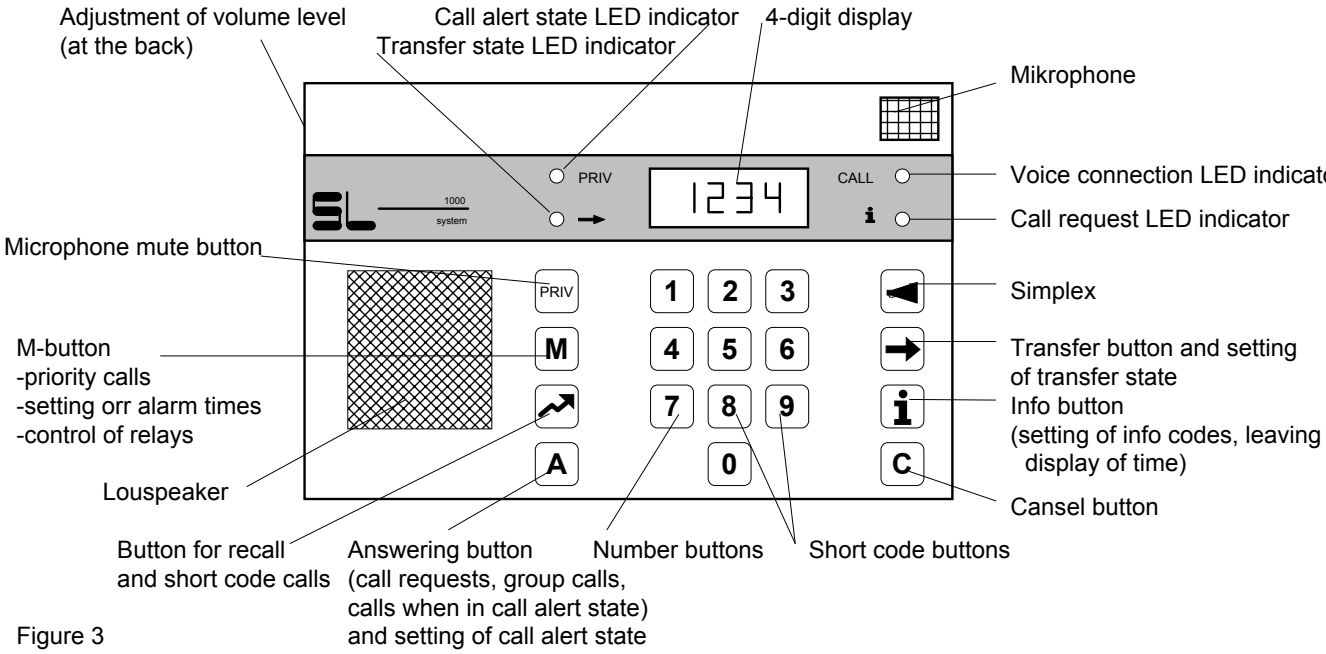


Figure 3

SIGNAL TONES

Start
Start of group call
Busy
Leaving of call request
Time alarm
Queuing
Alert state call

2.3.2 THE TERMINAL MODELS

The desk top models SL 1001 and SL 1002 D are equipped with a two meter (approx. 7 ft) long connection cable and a 8-pin RJ-45 plug. The wall mounted models have a 4-pole screw connector for the connecting of the cable.

The speech connection between the user terminals is half duplex with automatic speech direction switching. When both parties of the call are using a handset the connection is full duplex. The simplex button, which some of the models have, can be used for manual control of the speech direction.

Figure 4 shows the block diagram of the terminal models which have the display unit. From the simpler terminal models the display, the keyboard partly or wholly, and part of the LED indicators are missing.

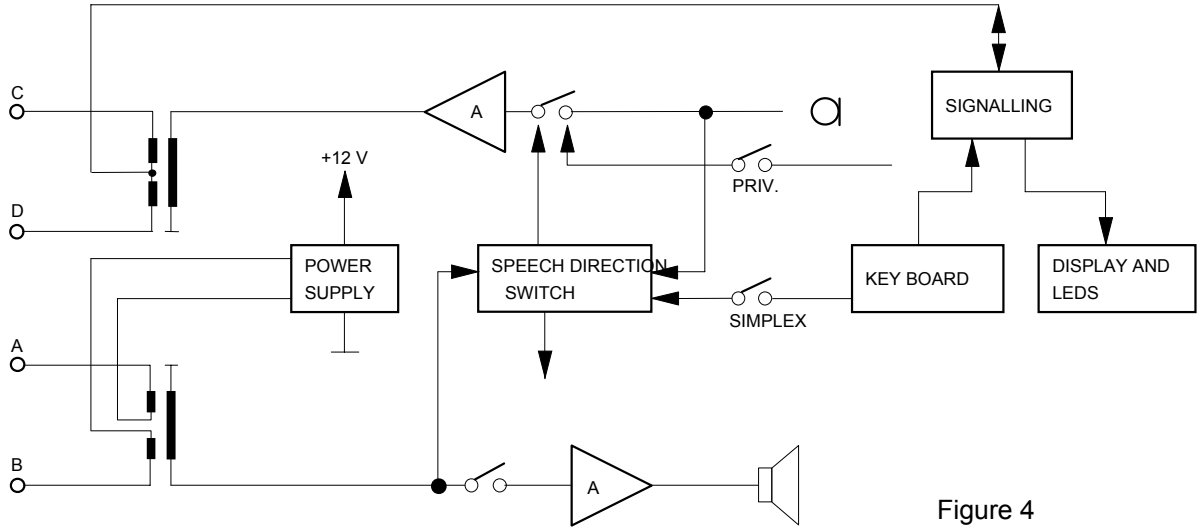


Figure 4

On the next page there is a list of the different terminal models and of their main purpose of use, and a table, which tells the main features of the models. More detailed information can be found from the data sheets of the individual models.

List of the different terminal models and their main purposes of use

SL 1001	Simple desk top model for office or similar use without display unit and function buttons connected with it.
SL 1002 D	Desk top model with display and complete set of buttons for office or similar use. Complete set of buttons.
SL 1002 DH	Same with handset.
SL 1003	Door terminal without display for indoor use. 2-4 call buttons or 3 call buttons and answering button for group calls.
SL 1008	Terminals with display for wall mounting in office environment. Complete set of buttons.
SL 1008 H	Same with handset.
SL 1011	Loudspeaker terminal without microphone and call buttons.
SL 1013	Passive subterminal with microphone and loudspeaker but without call buttons.

SL 1000 Compact Main features of the terminals	SL 1001	SL 1002 D	SL 1002 DH	SL 1003	SL 1008	SL 1008 H	SL 1006	SL 1011	SL 1013
Display unit	-	+	+	-	+	+	-	-	-
LED-indicators:									
CALL	+	+	+	+	+	+	+	-	+
i	+	+	+	-	+	+	-	-	-
A	+	+	+	+	+	+	-	-	-
→	+	+	+	-	+	+	-	-	-
Number buttons	10	10	10	2-4	10	10	1-3	0	0
Function buttons									
C	+	+	+	+	+	+	-	-	-
i	+	+	+	+	+	+	-	-	-
→	+	+	+	+	+	+	-	-	-
A	+	+	+	(+)	+	+	-	-	-
↯	+	+	+	-	+	+	-	-	-
M	+	+	+	-	+	+	-	-	-
PRIV. (I∅)	+	+	+	-	+	+	-	-	-
◄ (SIMPLEX)	+	+	+	-	+	+	-	-	-
Handset	-	-	+	-	-	+	-	-	-
Microphone	+	+	+	+	+	+	+	-	+
Internal speaker	+	+	+	+	+	+	+	+	+
Manually operated volume control	+	+	+	-	+	+	-	-	-
Tool operated volume control	-	-	-	+	-	-	+	+	+
Output power 600 mW	+	+	+	+	+	+	+	-	-
[(+) = with 1000 mW	-	-	-	-	-	-	-	-	+
external speaker 2200 mW	-	-	-	-	-	-	-	+	(+)

2.3.3 THE SPECIAL CONNECTION UNITS

The audio input connection unit SL 1000 AIC-L/D and the audio output connection unit SL 1000 AOC-RB can be connected to any connection number instead of a terminal.

The SL 1000 AIC-L/D

The SL 1000 AIC-L/D (Audio Input Connection Unit) is needed when a program source, such as a radio or CD-player, is to be connected to the central.

The AIC-L/D unit is placed in a small box with the dimensions 150x80x50 mm (approximately 6x3x2 inches). Inside the box there are screw connectors for connecting to the Compact system and the program source.

When the AIC-L/D is used the number of the central to which it is connected must be defined to be a program source, see section 5.2.A and the programming instructions in chapter 6.

The SL 1000 AOC-RB

An external amplifier with loudspeakers can be connected to any connection number of the Compact system for announcement purposes, with the help of the SL 1000 AOC-RB (Audio Output Connection unit with Relay). By calling the assigned connection number from any user terminal of the system announcements can be given.

The unit is placed in a small box with the dimensions 150x80x50 mm (approximately 6x3x2 inches). Inside the box there are screw connectors for connecting to the Compact central, the amplifier, and the relay contacts. The relay can be used for e.g. selecting the input to the amplifier, if the loudspeaker system is used for background music between announcements.

3. INSTALLATION, CONNECTING AND TAKING INTO USE

3.1. THE INSTALLATION

3.1.1 CONTENTS OF DELIVERY

The SL 1000 Compact delivery consists of:

- the central cabinet including the power supply, the processor card, and the mounting accessories
- 1-8 connection cards for the user terminal (as ordered)
- the mains cable (2 m long, approx. 7 ft)
- warranty certificates, one for the basic central and one for each connection card
- instructions for use, one for each terminal included in the delivery
- the taking into use form of the system
- this system manual

and as optional additions (as ordered):

- the real time clock card with warranty certificate
- the relay card with warranty certificate
- the serial communication card with warranty certificate
- the extension card for the bus for the optional cards with warranty certificate

2-32 user terminals (as ordered) with warranty certificates

Optional special connection units (as ordered)

- AIC-L/D units for connecting program sources
- AOC-RB units for connecting to amplifiers with loudspeaker

Other equipment (as ordered)

- program sources (radio or tape recorder)
- amplifiers and loudspeakers
- TAR relay units for the terminals

3.1.2 INSTALLATION SCHEMES AND REQUIREMENTS

The SL 1000 Compact central can, thanks to its compact size (520 mm wide, 275 mm high, 110 mm deep, and weight max 9,5 kg) and noiselessness, be mounted even on the wall of the office. It is, however often better to place it in a room into which only authorized persons are allowed. The only requirements are that there is sufficient air circulation through the central cabinet, that the relative humidity is in the range 20-80 %, and that the ambient temperature preferably is between +15-25 °C (60-80 ºF).

The central will operate in the temperature range +0-45 °C 32-113 ºF), but big fluctuations in the temperature or a constantly increased temperature will shorten equipment life time and lead to higher service and maintenance costs..

The central cabinet consists of five parts; the mounting plate, the front cover, and the two end plates. All the rest of the parts are fastened to the mounting plate, see figure 5.

The central cabinet is designed for horizontal wall mounting so that the mains connector is on the left and the inlet for the cables from the terminals on the right. Then the air circulation through the power supply part at the left end of the cabinet is as efficient as it can be. The ventilation holes at the upper land lower left end of the cover are not to be covered.

If there is not room enough for a horizontal mounting of the central cabinet, it can be vertically mounted so that the power supply and mains connector are pointing upwards, although this way of installation is not recommended. In no case is it allowed to mount the central cabinet upside down, so that the power supply is on the right hand side, or vertically so that the power supply is at the lower end.

The necessary accessories for mounting the central cabinet on the wall are included in the delivery: 4 wall plugs for a hole with a diameter of 8 mm and a depth of not less than 40 mm, and 4 screws of dimensions 5,5x38 mm. The distances between the holes, when mounting the cabinet horizontally, is 300 mm

horizontally and 220 mm vertically. (The positions of these holes are marked on the cover of the central package, which can be teared off and used as help in the drilling.)

It is very convenient to install two user terminal sockets just next to the central cabinet: one to function as the socket for the programming terminal, and one to function as the socket for a maintenance terminal, see section 3.2.3.

With the help of these two sockets it is possible to test all the connection numbers of the central simply by moving the cables of the sockets from one number to another on all connection cards, which is of great help when searching for faults in the central or for damaged cables between central and user terminal.

If a junction box or some other form of intermediate termination is used in the cabling at the central's end, see section 2.2, this box should be installed close to the cabinet noticing that the inlet for the cables is on the right hand side of the cabinet in horizontal installation (at the bottom in vertical installation). The end plate of the cabinet is fastened with four screws and can be removed to make the connecting of the cables easier. Especially in small system, say 20 user terminals or less, one can do without the intermediate termination by bringing the cables directly inside the cabinet. The cable opening in the end plate is equipped with a screw tightened bracket for strain relief of the cables.

Standard telephone network installation practices should be followed in the cabling. The cables should be laid so that they are protected against physical damage and against interference from high frequency, heavy current or high voltage cables and devices.

A Mains connector
B Cable etnrance 25 x 92
Strain relief screws 2 x M4
C Fastening screws for cover 4 x M4

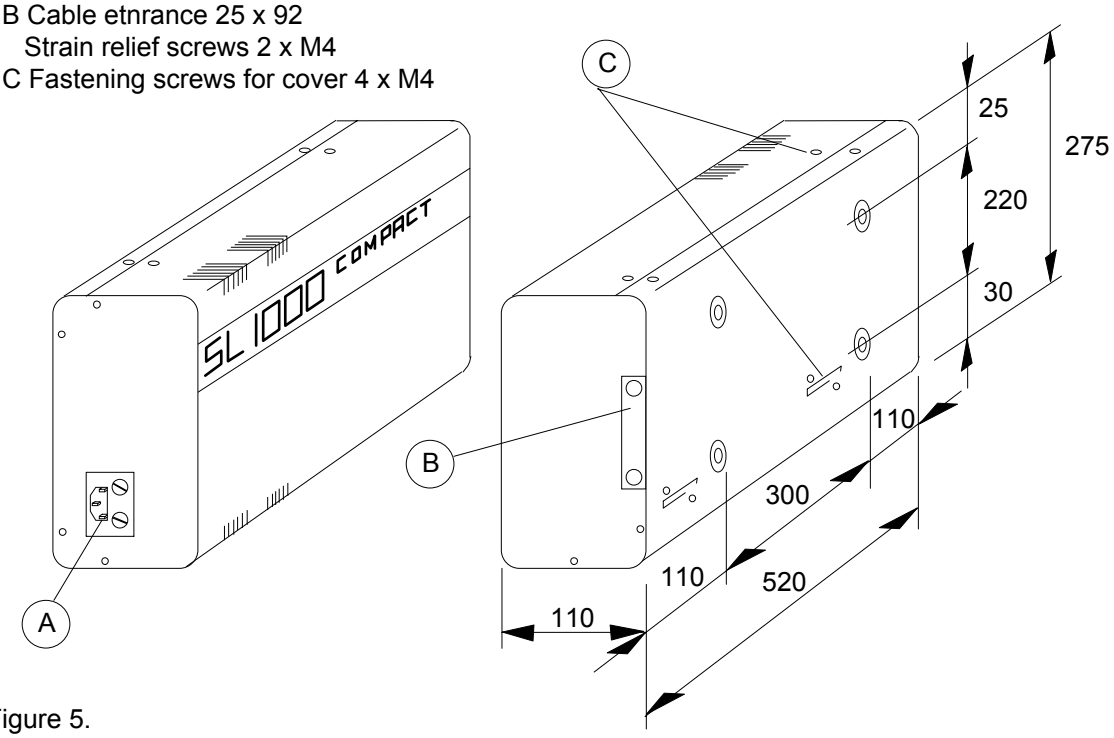
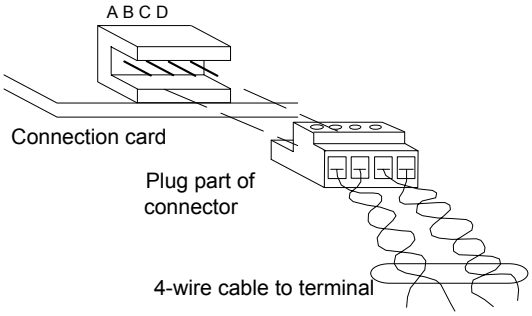


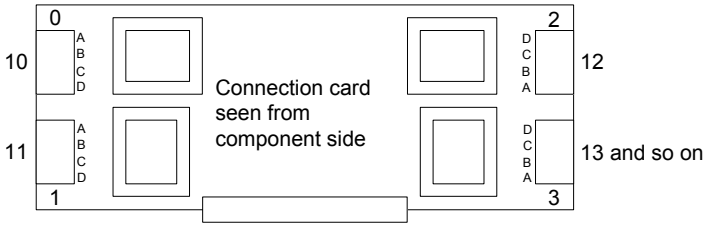
Figure 5.

3.2 THE CONNECTING OF THE UNITS

3.2.1 THE CONNECTION CARDS

The 4-wire cables from the user terminals are connected directly, or via an intermediate termination box, to the 4-pole screw connectors on the connection cards. The connectors consist of a socket and a plug part, and the unfastening of the plug during the connection procedure makes the job easier. Figure 6 shows how the connection numbers 10-41 are located on the cards and how the two twisted pairs A, B and C, D should be connected to the plug.





CONN.	Connection card number							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
0	10	14	18	22	26	30	34	38
1	11	15	19	23	27	31	35	39
2	12	16	20	24	28	32	36	40
3	13	17	21	25	29	33	37	41

Figure 6

3.2.2 THE USER TERMINALS

Desk top terminals: The 4-wire cable is at the user terminal end connected to a 8-pin RJ-45 wall socket.

RJ-45 connector's pin-number	TIA 568A colors in RJ-45 connector	Connection number of central
1	Green/White	
2	Green	
3	Orange/White	A
4	Blue	B
5	Blue/White	C
6	Orange	D
7	Brown/White	
8	Brown	

Wall terminals: The cable is connected to a 4-pole screw connector inside the terminal. The poles are, depending on the terminal model, marked ABCD, 1234 or 1212 from left to right.

3.2.3 THE PROGRAMMING TERMINAL AND THE MAINTENANCE TERMINAL

Close to the central cabinet two ESMI wall sockets are installed, one as the socket for the user programming terminal and the other for use during the taking into use of the system, and later for use during maintenance. The connecting of these two sockets is shown in figure 8.

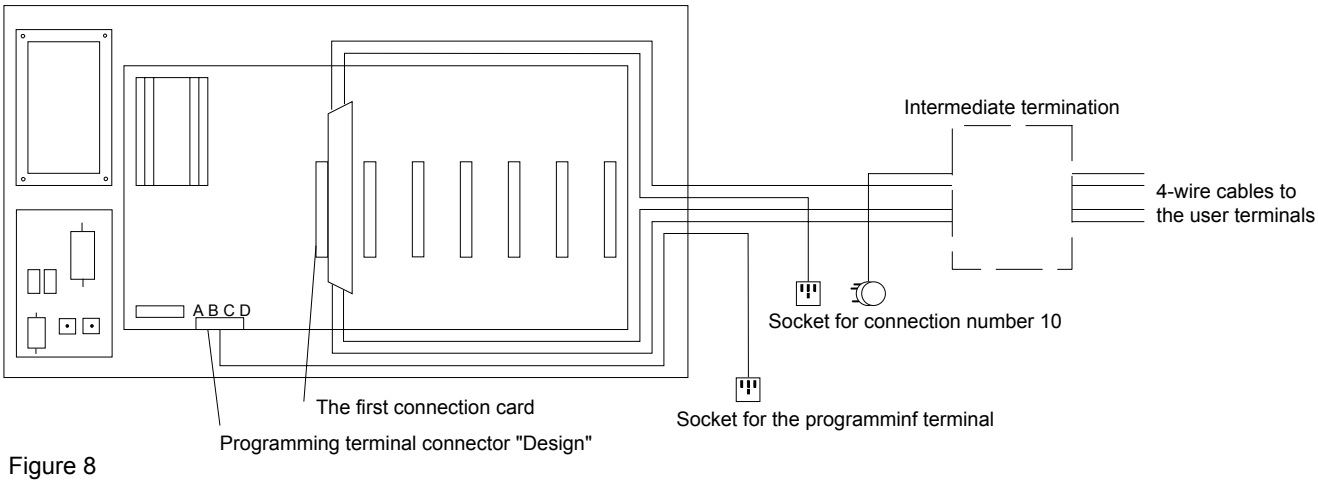
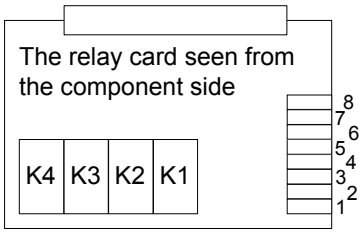
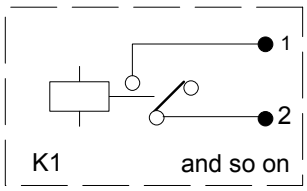


Figure 8

3.2.4 THE RELAY CARD

The optional relay card RC-4 of the Compact central has four relays, each with a normally open potential free contact. The connection of the 4 pairs of wires from the contacts uses two 4-pole screw connectors of the same type as on the connection cards foe the user terminals, so it is important to take care that the terminal and relay cables are not intermixed. Figure 9 shows how to connect the wires from the four relay contacts.





RELAY	Connector pins	
K1	1	2
K2	3	4
K3	5	6
K4	7	8

Figure 9

The relay contacts:
The maximum allowed current is 5 A, if the voltage is lower than 24 V DC or 49 V AC. The maximum voltage is 48 V DC or 49 V AC. The contact are rated for $1x10^5$ operations. If the current or the voltage is close to the maximum ratings, it is recommended to use intermediate relays to increase the relay life time and to decrease the size of the transients generated from the relay contacts. The two wires of the part of each relay cable which is located inside the cabinet should be twisted.

3.2.5 THE REAL TIME CLOCK CARD

If the optional real time clock RTC is taken into use, the two pins close to the battery must be interconnected with a piece of wire to give the clock circuit supply voltage. The card is delivered without these two pins connected, so that there is no load the battery.

3.2.6 THE SERIAL COMMUNICATION CARD

The SCC will be available later.

3.3 TAKING INTO USE

During the taking into use of the system, and later during replacement or addition of cards, it is important that cards are not removed or added when power is on.

The taking into use procedures, for which it is convenient to have two persons available, so that the connections between the user terminals can be tested, are the following:

1. Before any connection cards or optional cards are connected to the central: Connect the central to the mains and check that the three voltage LEDs (+30 V, +5 V, -5 V) on the processor card are lit.

   - if all three LEDs are off, check the primary and secondary fuses
   - if one or two are off, see the service manual (probably something wrong with the rectifiers and/or the +5 V and -5 V voltage regulators or the -30 V stabilizing transistor).

2. Disconnect the central from the mains.

3. When the LEDs are extinguished; put the first connection card in its place, and connect the user terminal cables (for connection numbers 10-13) to it.

4. Connect the central to the mains.

5. If the cabling hasn't been checked it is recommended that the polarity of the supply voltage +30 V is checked before the user terminals are plugged into the wall sockets (pole 1 = +30 V, pole 3 = 0 V, see figure 7 in section 3.2.2). Both the connection cards and the terminals will tolerate an inversed polarity for a short time period, but this should be avoided.

6. Connect terminals number 10 and 11 (equal to the physical connection numbers) to the wall sockets, and check that the connection between the two works bothways; call number 11 from number 10, and number 10 from number 11. (After connecting the terminal to the socket it will take a few seconds before the terminal will operate: the LEDs will flash once when the terminal is ready).

7. Connect terminal number 10 directly to the central: use the socket installed for maintenance use, if there is one as recommended, see figure 8 in section 3.2.3, or connect the terminal directly to the connection card.

   After this one of the two persons carrying out the taking into use will stay by the central cabinet, adding more connection cards as the taking into use proceeds, and keeping record of the functioning or malfunctioning connection numbers. The other person moves from terminal to terminal in number order.

8. Check that the connections 10-12 and 10-13 work bothways.

9. Disconnect the central from the mains.

10. Add connection card number 2 (connection numbers 14-17) to the central.

11. Connect the central to the mains.

12. Check that the connections 10-14, 10-15, 10-16 and 10-17 work bothways.

13. Repeat steps 9-12 for connection cards 3-8 (connection numbers 18-41) depending on the size of the system.

14. If optional cards (real time clock card, relay card, serial communication card) are included in the system, these are added to the central when power is off. Necessary connections are performed, see sections 3.2.4 to 3.2.6, and the power is connected on.

15. Move the terminal connected directly to connection number 10 to the socket for the programming terminal, and connect the cable going to the real location of terminal number 10 to connection number 10.

16. Perform the user programming of the system, e-g- the free numbering of the system, following the instructions of chapter 6, after which the programmed terminal numbers are to be used instead of the connection numbers 10-41.

    Even if no special programming is needed, the clock of the system should be set, except if all user terminal are without display. This setting of the clock can be done from the programming terminal, or alternatively from any terminal to which the priority right has been given. Connection number 10 has initially this priority right without programming, so in certain cases the user programming can be left completely undone, and the system will work in its basic form.

17. Check the functioning of the optional relay and serial communication cards.

18. Disconnect the terminal used as the programming terminal, and take it to its right place at connection number 10. Perform the setting of the clock (setting sequence **M i** $H_1H_2M_1M_2$, where H_1H_2 = the hours, M_1M_2 = the minutes), if it hasn't been done from the programming terminal.

19. Fill in the taking into use form of the system.

    The person carrying out the taking into use fulls in the form, paying special attention to the program version and the special features of the system, because these are important for future expansions and possible maintenance.

    The various parts of the taking into use are marked as accepted, or the observed malfunctions or defects are noted. If there are no defects, or if these are minor, and the time or repairing them is agreed on and put on the form, the form is marked with the date, and both the customer and the person which has taken the system into use as a representative of the supplier sign the form, thus accepting the taking into use.

    The warranty period of the system begins from the signature date, or the date separately agreed on and marked on the form. The warranty certificates of all units are collected and filled in with the date. The originals of the certificates are left with the customer, the copies are sent to the manufacturer together with the last page of taking into use form. The first page of the form stays with the customer, the second page is given to the supplier.

4. FAULTFINDING

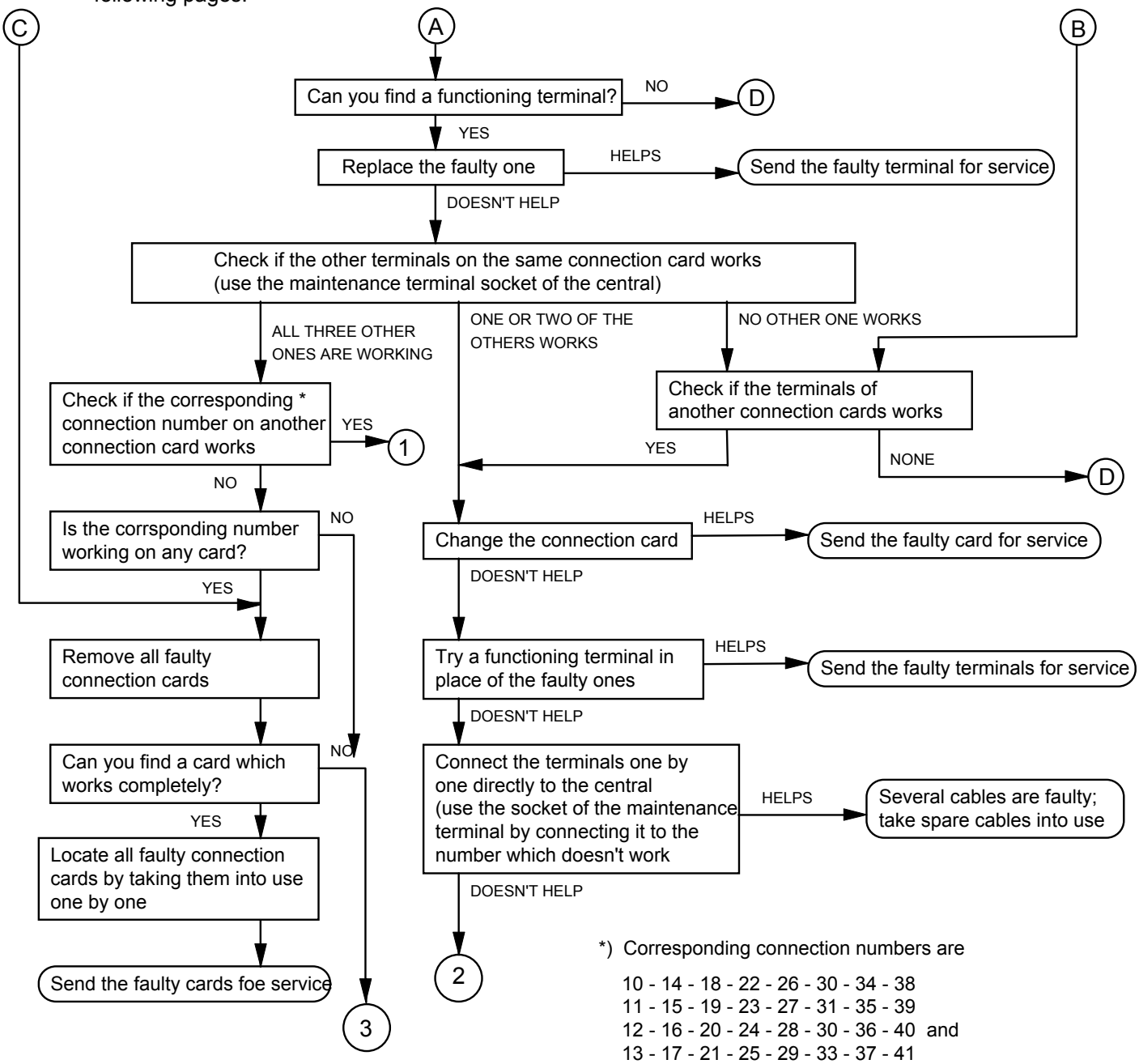
With the help of the faultfinding guide on the following pages, the most probable fault situations of the Compact system can be located and taken care of. The locating is, in practice, done by replacing the suspected unit (user terminal, connection card, cable, integrated circuit) with a functioning one. No soldering iron is needed: If the fault is located to the processor card, which does not have a replacement unit, the replacement of two of its integrated circuits mounted into sockets (the 8085A and the 8155) is tried, but the guide does not go any further. If these replacements do not help, please refer to the separate service instructions for the system.

Whenever replacing units of the central, that is connection cards, optional cards or integrated circuits, please note that this must not be done when power is connected to the central: before removing or adding cards or components, check that the three processor card LEDs (+30 V, +5 V, -5V) are off.

Possible fault situations can roughly be divided into four categories:

1. The fault is related to one particular user terminal
2. The fault is related to several or all user terminals connected to one particular connection card
3. The fault is related to several user terminals connected to several particular connection cards
4. The fault is related to the total system, no user terminal is functioning

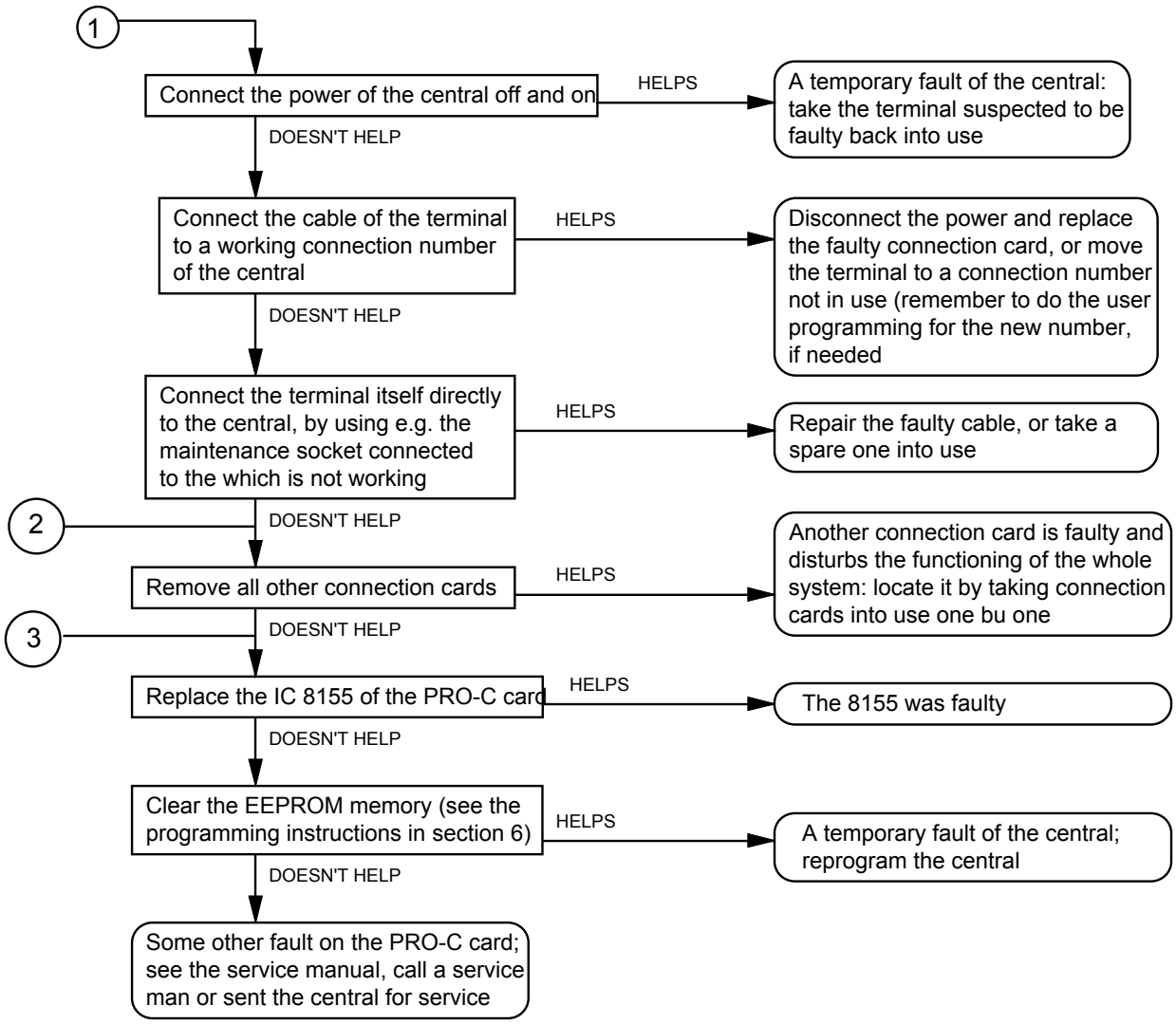
These four cases are handled a little differently, as can be seen from the faultfinding diagrams on the following pages.

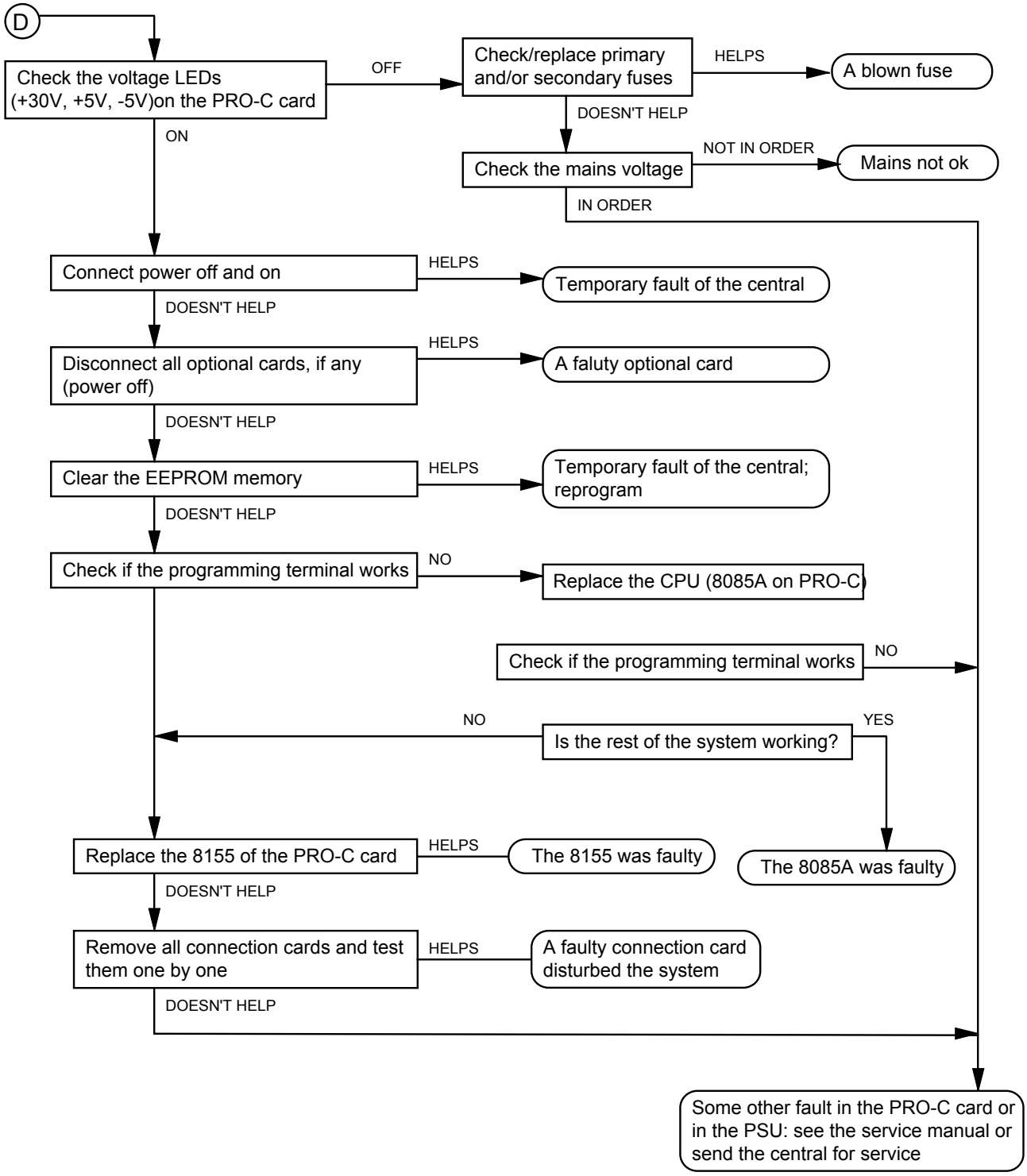


*) Corresponding connection numbers are

10 - 14 - 18 - 22 - 26 - 30 - 34 - 38
11 - 15 - 19 - 23 - 27 - 31 - 35 - 39
12 - 16 - 20 - 24 - 28 - 30 - 36 - 40 and
13 - 17 - 21 - 25 - 29 - 33 - 37 - 41

(see figure 6 in section 3.2.1)


1
Connect the power of the central off and on
HELPS
A temporary fault of the central: take the terminal suspected to be faulty back into use
DOESN'T HELP
Connect the cable of the terminal to a working connection number of the central
HELPS
Disconnect the power and replace the faulty connection card, or move the terminal to a connection number not in use (remember to do the user programming for the new number, if needed
DOESN'T HELP
Connect the terminal itself directly to the central, by using e.g. the maintenance socket connected to the which is not working
HELPS
Repair the faulty cable, or take a spare one into use
2
DOESN'T HELP
Remove all other connection cards
HELPS
Another connection card is faulty and disturbs the functioning of the whole system: locate it by taking connection cards into use one bu one
3
DOESN'T HELP
Replace the IC 8155 of the PRO-C card
HELPS
The 8155 was faulty
DOESN'T HELP
Clear the EEPROM memory (see the programming instructions in section 6)
HELPS
A temporary fault of the central; reprogram the central
DOESN'T HELP
Some other fault on the PRO-C card; see the service manual, call a service man or sent the central for service


D
Check the voltage LEDs (+30V, +5V, -5V)on the PRO-C card
OFF
Check/replace primary and/or secondary fuses
HELPS
A blown fuse
DOESN'T HELP
ON
NOT IN ORDER
Check the mains voltage
Mains not ok
IN ORDER
Connect power off and on
HELPS
Temporary fault of the central
DOESN'T HELP
Disconnect all optional cards, if any (power off)
HELPS
A faluty optional card
DOESN'T HELP
Clear the EEPROM memory
HELPS
Temporary fault of the central; reprogram
DOESN'T HELP
Check if the programming terminal works
NO
Replace the CPU (8085A on PRO-C)
Check if the programming terminal works
NO
NO
Is the rest of the system working?
YES
Replace the 8155 of the PRO-C card
HELPS
The 8155 was faulty
The 8085A was faulty
DOESN'T HELP
Remove all connection cards and test them one by one
HELPS
A faulty connection card disturbed the system
DOESN'T HELP
Some other fault in the PRO-C card or in the PSU: see the service manual or send the central for service

5. SYSTEM FUNCTIONS

When considering the system functions, please note that part of the functions work only with user terminal models with display. Terminals with and without display are completely interchangeable, the central unit doesn't even know which alternative is connected to a specific connection number.

5.1 THE BASIC FUNCTIONS

1. Free numbering with one or two numbers per terminal.
   Each terminal can be given one or two 2-, 3- or 4-digits long freely selectable numbers (all numbers of same length).

2. Normal call
   Automatic speech connection between two terminals after number selection. The speech connection is half duplex with automatic speech direction switching. Manual speech direction control with simplex button is also possible. The connection is full duplex if both parties of the call use the optional handset of the terminal. Three simultaneous two-way speech connections, and one one-way listening channel.

3. Short code dialling
   Three short code dialling numbers can be programmed for each terminal.

4. Display and LED indicators
   The 4-digit numeric display unit of the terminal shows:
   - the dialled number
   - the number of the caller
   - the transfer number (of the terminal itself or of the called terminal)
   - the number of the caller who has left a call back request
   - the stored information code (of the terminal itself or of the called terminal)
   - the time

   The 4 LEDs of the terminal shows:
   - **CALL** a voice connection (the microphone) is connected on
   - **i** a call back request has been left in the terminal
   - **A** the terminal is in the call alert state
   - → the terminal is in the transfer state

5. Storing of information codes
   A 4-digit numeric information code can be stored into the display of the terminal. The info code tells e.g. the estimated time or date of return, or the reason for absence, and is seen by every caller on his or her own display, when calling this terminal.

6. Leaving of call back request
   A call back request can be left in a terminal when the called person is busy or absent. The call request is kept in memory until it is answered or cleared. Several call back requests can be left in any terminal. A call back request can also be cancelled by the person who left it.

7. Answering a call back request
   Answering a call back request is a one-button function. If there are several requests left in the same terminal, these can be scanned and answered in any order.

8. Recall
Redialling the previous connection or the last call attempt number is a one-button functions.

9. Undisturbed working
Versatile possibilities of not being overheard or disturbed by callers:
- momentary microphone mute
- setting the terminal in the call alert state momentarily or continuously. Incoming calls are not connected directly, but start alarming. The number of the caller is seen on the display, and the call can be accepted or cleared
- setting the terminal in the "momentarily busy" state (info code 6666) by depressing a single button e.g. when an intercom call is connected during an external telephone call. An automatic call back request is at the same time left in your terminal to the terminal that called, and can be answered when the telephone call is ended
- setting the terminal in the "busy" or "do not disturb" state (info code 7777). In this state incoming calls are not connected nor group and all calls heard.

10. Time display
The time of the system clock is momentarily displayed by the depressing of one button.

11. Alarm times
Alarm times can be programmed into the terminals. The alarms can also be set to be repeated at the same time every day. The time is displayed when the alarm sounds

12. Emergency all call
The emergency call, which can be initiated from priority terminals only, is connected to all terminals of the system.

13. All call with answering possibility
The all call is connected to all terminals except those which have a speech connection on or are in the "do not disturb" state.

14. Two programmable group calls with answering possibility
As the all call, but the members of each group can be selected by the customer.

15. Answering an all call or a group call
Answering a group or an all call is a one-button function. A speech connection is established between the answerer and the caller. This can be used as a simple but efficient paging method.

16. Enquiry call
An enquiry call can be made during a call without breaking the existing connection.

17. Transferring an ongoing call
An ongoing call can be transferred to the enquiry call number without breaking the existing connection.

18. Preprogrammed call transfer
All incoming calls can automatically be set to be transferred to any preprogrammed number.

19. Follow me function
The preprogrammed call transfer can be remotely set from another terminal so that the incoming calls follow the person who does the setting to the location where he is at present.

20. Priority call
Terminals, to which priority right has been given,
- can interrupt an ongoing call
- can get through when calling terminals which are in the call alert state
- can make terminals in the "do not disturb" state (7777) alarm
- can make the emergency call (also from terminals without display).

21. Group hunting
Automatic call transfer to the first unengaged terminal in a hunt group. The number and size of the hunt groups are not limited, but each terminal can belong to only one group.

22. Call blocking
Calls can be blocked or prevented from any terminal to any other terminal or to the group call and all call numbers.

23. Remote setting of the info code
The info code of a terminal can be remotely set, cleared or changed from another terminal.

24. Remote checking of call back requests
Call back requests left in a terminal can be checked from another terminal.

25. Chief/secretary function
An unlimited automatic chief/secretary function is programmable for any pairs of terminals, through the use of preprogrammed call transfer, call enquiry and transferring of an ongoing call.

The main part of the above listed basic functions work in the basic mode of the system, that is without any user programming, but part of the functions require some kind of setting or programming. This programming can partly be done from the user terminal, which in most cases must be one with display, but partly only from the programming terminal. Any terminal with display can be used as the programming connector of the central for the time of the programming. During programming the system cannot be used for calling.

The following basic functions require programming, of which the programming terminal programming is explained in chapter 6, User programming of the system, and the user terminal programming in chapter 7, Instructions for use;

1. Free numbering
The free numbering programming can be done from the programming terminal only. The emergency all call, two group calls, and the all call can be given one freely selectable number, and each connection number one or two freely selectable numbers, of which one is the so called main number, and the other the parallel number. When such a terminal with two calling another terminal, the main number is always seen on the display at the other end.

This double numbering possibility is convenient to use when two persons are sharing a terminal. It can also be used for giving "numbers easier to remember" to persons which are frequently called, e.g. the telephone operator or the department secretaries, to be used in parallel with their "real" numbers, which usually are the same as their telephone numbers.

All programmed numbers are of the same length (2-4 digits long).

If no programming is performed, the following "physical" numbers are in use:

10-42 = the connection numbers
00 = the emergency all call
01 = group call number 1
02 = group call number 2
03 = the all call

If some of the physical numbers are given e.g. a 3-digit long programmed number, but not all, the calling numbers for the unprogrammed ones will be 000, 001, 002, 003, 010-041.

3. Short code numbers
Each "ordinary" terminal, see terminal types in section 5.2, Special features of the terminals, can be given three short code dialling numbers. The dialling sequences for these will be 1, 2, 3. A special terminal, such as a door terminal, can have 1-10 short code dialling numbers, which all are one-button functions.

The programming of the short codes can be done from the ordinary terminal itself, or from the programming terminal.

9. Undisturbed working / Call alert state
The setting of a terminal with display into the momentary call alert state is done from the terminal itself.

The setting of any terminal into the continuous call alert state is done from the programming terminal. The continuos call alert state can not be cleared from the user terminal.

11. Alarm times
The programming of the one-time or repeating alarm times is done from the user terminal with display.

12. Emergency all call
The emergency all call can be initiated only from terminals, which have been given the priority right. This right is given from the programming terminal, Connection numbers 10 has the priority right without programming.

14. Group calls
The two group calls work only if the members of the group have been defined, which is done from the programming terminal. Both groups can have 1-32 members.

18. Preprogrammed call transfer
The automatic transfer of incoming calls to another number works only if the transfer number has been preset and the transfer state is on. The transfer number can be programmed from the programming terminal or from the terminal with display itself. The transfer state is set and cleared from the display terminal itself.

20. Priority call
A priority call can be made from any terminal with display, to which the priority right has been given. This is done from the programming terminal. Connection number 10 has this tight without programming.

21. Group hunting
The group hunting will work only if the terminals belonging to a hunt group have been programmed to be hunt group members, and have their second call transfer address pointing to the next member of the group. These programmings can only be done from the programming terminal.

22. Call blocking
The blockings can be set from the programming terminal only.

25. Chief/secretaty function
The chief/secretary function will work after programming the chief's terminal to have the secretary's number as the transfer number and as one of the short code numbers, and the secretary's terminal to have the number of the chief as one of the short code numbers.

These programmings can be done either from the programming terminals or from the two user terminals themselves.

5.2 THE SPECIAL FUNCTIONS AND FEATURES IF THE TERMINALS

In addition to the basic functions of the system, there are several special functions and features of the individual terminals, which can be connected on or off or defined in more detail from the programming terminal.

In the following sections A-Q section A describes feature number 16, and sections B-Q features numbers 00-15. When doing the programming, the number of the feature is used, see chapter 6.

A Terminal type (feature number 16)

The type of the terminal can be defined to be;
a an ordinary terminal
b a door terminal
c a program source

a The ordinary terminal is the initial value for all connection numbers without user programming. The terminal functions in the "normal" way.

b The door terminal differs from the ordinary terminal so, that all its call buttons are one-button short code buttons, and that every other depressing of any call button works as the cancelling button C.

If the door terminal has five call buttons or less, their target addresses are programmed into the following numbers in the listed order;
- short code number 1
- short code number 2
- short code number 3
- transfer number
- group hunting transfer number

If the terminals has 6-10 call buttons, the extra buttons will make calls to the physical numbers which follow the group hunting transfer number. As a example, if the group hunting number is the physical number 23, the sixth call button will go to the physical number 24, the seventh to the physical number 25, and so on.

c Defining the terminal type to be a program source means, that only one-way connections can be made to this connection number, so the number works as a listening channel. The system has always one one-way channel, in addition to the three two-way channels, and this one-way channel cannot be used for any other purposes than as a listening channel.

When listening to a number defined as a program source, the listening is interrupted by all incoming calls, except if the terminal which is listening has been given the special feature "Program channel listening is not interrupted", see section E.

If more than one program source is connected, and two or more of them are listened to simultaneously, it means that two-way speech channels, of which there are three, must be taken into listening channel use. Because of the one-way nature of these channels, two of them can use one speech channel at the same time. The alternative amounts of speech and listening channels is thus:

speech channels	3	2	2	1	1	0	0
listening channels	1	2	3	4	5	6	7

A program source is usually connected to the central via an SL 1000 AIC-L/D unit, see section 2.3.3.

B Priority right (feature number 00)

Terminals to which the priority right has been given:
- can disconnect an ongoing call with their M-button. The other party of the original call is put on hold, hearing a queuing tone. If the priority call ends within 30 seconds the original call is

re-established, otherwise it is disconnected and the queuing tone ends
- can get through a set call alert state of any terminal with their M-button, so that the connection is made without the called person having to answer it with his A-button
- can, with their M-button, make terminals in the "do not disturb" state (info code 7777) alarm, but cannot make the connection, unless the called party answers with his A-button
- can set the clock with the key sequence **M i** 1230 (at 12.30 p.m.)

C Removing the right to make group and all calls (feature number 01)

The initial situation is that all terminals are allowed to make the group calls 01 and 02, and the all call 03 (or the corresponding programmed numbers). The emergency all call 00 can, on the other hand, only be made from priority terminals.

The right to make group and all calls can be removed from any terminals by programming them the feature "not allowed to make group and all calls". If this is done to a terminal, to which the priority right has been given, it can make the emergency all call..

D Continuous call alert state (feature number 02)

The terminals can be set into two different call alert states, in which the incoming calls do not connect but start alarming, which the receiver of the call can answer with his A-button or clear with his C-button.

The momentary call alert state can be set from the terminal itself with the key sequence **i A**, which turns the A-LED on, and cleared with the C-button.

The continuous call alert state can be set and cleared from the programming terminal, but not from the user terminal.

E Program channel listening is not interrupted (feature number 03)

Normally all incoming calls interrupt the connection to a number which has been defined as a program source, see section A. When the interrupting call ends, the listening is resumed automatically.

If desired, any terminals can be given the feature "program channel listening not interrupted". When calling such a terminal which has the listening connected on, the normal busy tone is heard. If the caller leaves a call back request, the listener will observe this from the **i**-LED which lits, and from a short tone signal, and can answer the call back request when the listening permits.

G Preventing of the "follow me"-function (feature number 05)

The remote setting of the call transfer state of a terminal can normally be done from any other terminal, so that all incoming calls are rerouted to the terminal from which the setting was done.

This follow me possibility can, however, if needed e.g. for security reasons or to avoid misuse, be removed from any terminal. this is done from the programming terminal and should usually be done for the answering terminals for door terminal calls, at least if they are controlling a door opening relay, because otherwise the calls from the door, and at the same time the door opening possibility, can be captured by any terminal in the system.

The preventing of the "follow me" for a specific terminal does not remove the possibility of presetting the transfer state and number from the terminal itself.

H All incoming calls are call requests (feature number 06)

Any terminals can be given the special feature "all incoming calls are call requests". Such terminals cannot be called directly, but every attempt leads to an automatic leaving of a call back request, which the called person can answer or clear when he wants to.

Thus feature is useful e.g. in messenger call applications.

I All outgoing calls are call requests (feature number 07)

Any terminals can be given the special feature "all outgoing calls are call requests". Such terminals can call a number defined as a program source, and make (emergency) all calls and group calls, but every attempt to make a normal terminal to terminal call leads to the automatic leaving or a call back request.

This feature is useful e.g. in nurse call applications. When the reception is called from a patient terminal, it only leaves a call back request.

J The terminal is equipped with a relay (feature number 08)

A TAR-unit (Terminal Auxiliary Relay) can be installed in any terminal. The relay can be operated with the M-button of any terminal which has a speech connection with this terminal.

So that the central unit know that the terminal is equipped with such an "M-TAR-relay" to be able to control it, this must be defined through programming.

The relay can be used to control e.g. an extra buzzer or an electrical door lock. The TAR can be connected to operate from the momentary depressing of the M-button for 1-3 seconds or until the speech connection is terminated.

The TAR-unit of a terminal can also be connected to be controlled by the CALL-LED, in which case it starts to operate from the beginning of the speech connection. This alternative, which does not need any user programming of the central, is suitable for the control of e.g. a CCTV-camera or a tape recorder, when it is useful that the controlled device is on during the whole connection.

K The terminal has a CALL-relay on the relay card of the central (feature number 09)

An alternative to relays located in the user terminals is the optional relay card RC-4 of the central unit. The card has four relays, and by programming one must define to which terminal each relay belongs. When this terminal has a speech connection with another terminal, the relay will operate, either automatically ("CALL-relay") of from the moment the M-button is momentarily depressed in this other terminal (see section L below for the "M-relay").

The operating time of the relay can also be programmed in the range 1-225 seconds, so the longest time is 4 min 15 s. Of the value 0 s is specified, it means that the relay will operate until the end of the connection. In addition one can choose whether the time out also disconnects the speech connection of it is still on, or not.

The choice between using TAR relay units in the terminals of the relay card in the central often depends on the cabling costs; is the device to be controlled closer to the terminal or to the central. Additionally, the central can contain only four relays, but each user terminals can contain one or two relays of its own.

L The terminal has a M-relay on the relay card of the central (feature number 10)

The relays on the relay card of the central can alternatively be programmed to be the so called M-relays of certain terminals. In this case the relays starts to operate when the M-button is momentarily depressed in the terminal this terminal is in speech connection with.

Also with the M-relay one can set the operation time to be between 1 and 255 seconds or continuous (= 0 s), and select whether the time out terminates a still ongoing connection or not.

M-Q Features number 11-15

These special features are reserved for future needs.

5.3 THE GROUP CALLS

In addition to the emergency all call (00 or the programmed number) and the all call (03 or the programmed number) there are two programmable group calls (01 and 02 or programmed numbers).

Simultaneously only one of these four calls can be on progresss. The emergency all call will terminate an ongoing group or all call.

The emergency all call, which can be made from priority terminals only, will connect to all terminals of the system. The all call and the group calls will connect to all terminals which do not have a speech connection on with another terminal, except to those which are in the "do not disturb" state, that is have the info code 7777 set.

The group calls will not operate until members have been assigned to the groups, which is done from the programming terminal. Each group can have 1-32 members, and the same terminals can belong to both groups. See section 6.1.3 and 6.2.3.

The all call and the group calls have an answering possibility: the depressing of the A-button in any terminal from which the all call or group call is heard, will establish a normal call between the caller and the answer of the call. The emergency all call does not have this option, so that the emergency announcement isn't terminated by someone answering it.

5.4 THE BLOCKINGS

The initial status of the system is, that any one user terminal can call other user terminal. Additionally all terminals are allowed to make the group and all calls.

The emergency all call is restricted so, that only priority terminals can make it.

The right to make group and all calls can be removed from any terminals by programming to them feature number 01, see section 5.2.C.

The connections between individual terminals can be prevented in either one or in both directions. These blocking options are complete, that is any one connection number 10-41 can be blocked from calling any other connection number 10-41. See sections 6.1.6 and 6.2.6.

6. USER PROGRAMMING OF THE SYSTEM

When the SL 1000 Compact system is delivered it functions in lits basic mode, meaning that no programmable functions or special features are connected on. In practice this means, among other things, that:
- the numbers of the user terminals are identical to the physical connection numbers, which are 10-41
- the emergency all call number is 00
- the group call numbers are 01 and 02, but both groups are empty
- the all call number is 03
- all connection numbers are "ordinary terminals", see section 5.2.A
- user terminal number 10 is the only one with the priority right

If the user doesn't want to make of the free numbering option, form the group call groups, give the priority right or other special features to the other terminals, nor does he have any special terminal types, such as door terminals and program sources, the system is ready for use as it is. The only thing that should be done is the setting of the clock, which most conveniently is done from terminal number 10, see the Instruction in chapter 7.

If, on the other hand, the user wants to do some special programming, this is done with a normal desk top terminal with display, that is an SL 1002 D or DH model, which for the period of the programming is connected to the programming connector of the central, see figure 8 in section 3.2.3 .

The programming from the programming terminal is described in this chapter. Some programming can also be done from the user terminals; the short code dialling numbers can be programmed from the desk top terminal SL 1001 without display, and from the terminals with display one can additionally program the transfer number and the alarm times, plus set the terminal into the transfer state and call alert state. See the Instructions for use in chapter 7.

In section 6.1 all programmable functions and special features are gone through. Before starting the programming everything to program should be defined using the System Definition Diagram, which is the last page of the section. With the help of this diagram and the programming instructions of section 6.2 , the programming is easily performed. The last page of section 6.2 is the Programming Diagram, a one page summary of all the programming instructions. Finally, section 6.3 contains some simple programming examples to further help understanding the programming.

6.1 THE PROGRAMMABLE FUNCTIONS AND THE SYSTEM DEFINITION DIAGRAM

The programmable functions of the system have been discussed in detail in chapter 5, so here they will in most of the cases be discussed only briefly from the programming point of view, and in the same order as they appear in the System Definition Diagram, with the help of which the programming is performed, following the instructions of section 6.2.

6.1.1 THE FREE NUMBERS

Each terminal can be given one or two freely programmable numbers, the length of which is 2-4 digits. All programmed numbers must be of the same length: if they are not, they will be filled with prezeroes. The length of the numbers is selected according to section 6.2.1a.

The initial setting is that 2-digit numbers are used, and that the numbers of the terminals are equal to the physical connection numbers, that is 10-41. If the length of the numbers is changed to 3- or 4-digits, the numbers of the terminals will be 010-041 or 0010-0041, unless they are altered through programming.

The first free number is the main number, which is always seen by the called party in conjunction with outgoing calls. The programming of the parallel numbers is explained in section 6.2.1.c.

The emergency all call (00), the group calls (01 and 02) and the all call (03), where the numbers enclosed in parentheses are the "physical" numbers valid without programming, can be given only one free number each, see section 6.2.1.d.

6.1.2 THE TYPE OF THE TERMINAL

The initial assumption is that all terminals of the system are of type 0, meaning "ordinary terminals". If the system contains door terminals or connection numbers, to which program sources are connected, these numbers must be defined to be of type 1 (door terminal) or type 2 (program source). The programming is explained in section 6.2.2.

(The programming can also be done as explained in section 6.2.5 , which describes the programming of the special features 00-15, because the type of the terminal is special feature number 16 in the programming, see section 6.1.5.)

6.1.3 THE GROUP CALLS

There are two programmable groups in the system, the "physical" numbers of which are 01 and 02 without free numbering, The initial state is that both groups are empty, meaning that the group calls can be executed, but they do not go anywhere.

Both groups can be programmed to contain 1-32 members. The same terminals can belong to both groups, The programming is done according to section 6.2.3.

6.1.4 THE SHORT CODE NUMBERS AND THE TRANSFER NUMBERS

Each user terminal can be given three short code numbers and two transfer numbers of its own.

The programming of the short code numbers can, besides from the programming terminal, also be done from the user terminal, except in the cases of door terminals. These two alternative programmings are completely parallel, meaning that the one performed later will be valid. (the only difference is, that in the programming terminal from the programming terminal physical numbers are used, whereas free numbers are used, if such have been programmed, in the programming from the user terminal). In the door terminal cases the programming will have to be done from the programming terminal, and the depressing of the call buttons, of which there normally are 1-3, will make a connection to short code dialling numbers 1, 2, and 3. In the ordinary terminals the short code diallings are 1, 2, 3.

The programming of transfer number 1 can, in parallel with it being done from the programming terminal, also be done from a user terminal with display. Transfer number 1 is the one incoming calls are transferred to, if the terminal is in the transfer state.

The programming of transfer number 2 can, on the contrary, be done only from the programming terminal. This transfer number has to do with the group hunting feature, see section 5.2.F, meaning that it is the number to which incoming calls are transferred when the terminal is busy, in the call alert A-state or in the info code state, provided the terminal has been given the special feature "transfer to transfer number 2 if not free", see section 6.1.5.

If a door terminal has more than three call buttons, the two transfer numbers will determine to which numbers the depressing of the extra call buttons will make a call. The fourth call button will make a call to the number programmed as transfer number 1, the fifth button to the number programmed as transfer number 2, and the sixth, seventh, eighth, ninth and tenth call buttons to the physical numbers following transfer number 2, that is to the physical numbers corresponding to transfer number 2 +1, 2 +2, 2 +3, 2 +4 and 2 +5. the maximum number of ten call buttons per door terminal correspond to the number buttons 8, 9, 0, 1, ... , 7, of the terminal in the mentioned order.

A door terminal, which has more than three call buttons, should be programmed to have the feature "follow me not possible" set, see sections 5.2.G and 6.1.5, which prevents the remote setting of the transfer number, because otherwise the target address of the fourth call button can be altered from any terminal of the system. Additionally it is often necessary to prevent the "follow me" possibility from all answering terminals of door calls, because otherwise these door calls can be taken by any terminal.

The programming of the short code and transfer numbers is explained in section 6.2.4.

6.1.5 THE SPECIAL FEATURES OF THE TERMINALS

Each user terminal can be given one or several of the following special features, explained in more detail in chapter 5.2;

Feature	Explanation
00	The terminal has the priority right
01	The terminal is not allowed to make group and all calls
02	The terminal is continuously in the call alert A-state
03	The listening to a program channel is not interrupted for an incoming call
04	The terminal is member of a hunt group, meaning that the incoming call will be transferred to transfer number 2 if the terminal is busy or in the A-state or has an info code set
05	The remote setting of the transfer state and number (the follow me) is not possible for this terminal
06	All incoming calls to this terminal are not connected, but leave an automatic call back request in the terminal
07	All outgoing calls from this terminals are not connected, but leave an automatic call back request in the called terminal
08	The terminal contains relay, the TAR-unit , which can be remotely controlled be depressing the M-button in the terminal which is in speech connection with this terminal (the M-TAR- relay)
09	The terminal has a relay on the relay card of the central, which always operates when this terminal is in speech connection with another terminal (CALL-relay)
10	The terminal has a relay on the relay card of the central, which operates if the M-button is depressed in the terminal which is in speech connection with this terminal (M-relay)
11-15	Reserved for future needs
16	The terminal type: 0 = ordinary terminal 1 = door terminal 2 = program source

The features 00-15 can be given the values 1 = feature set, 0 = feature not set, and feature 16 the values 0, 1 or 2. See programming in section 6.2.5.

6.1.6 BLOCKINGS

The initial state of the system is, that any terminal is allowed to call any other terminal.

Each terminal can , however, without any limitations be blocked or prevented from calling certain other terminals.

For the definition of these blockings each terminal has eight sets of "blocking switches" which are four digits long each, making a total of 8 x 4 = 32 switches, one for each terminal in the system. If the switch is set (= 1), the terminal is not able to call the corresponding terminal. The initial setting is that all switches are 0.

The switches correspond to the terminals in the following way:

Set/switches			
1	XXXX	The terminal cannot call numbers	10, 11, 12, 13,
2	XXXX		14, 15, 16, 17,
3	XXXX		18, 19, 20, 21,
4	XXXX		22, 23, 24, 25,
5	XXXX		26, 27, 28, 29,
6	XXXX		30, 31, 32, 33,
7	XXXX		34, 35, 36, 37,
8	XXXX		38, 39, 40, 41,
		if the corresponding X = 1	

Setting a blocking to the terminal's own number does not affect the operation of the system, as a terminal cannot call its own numbers anyhow.

The programming of the blockings is explained in section 6.2.6.

6.1.7 THE RELAYS

The optional relay card RC-4 of the central contains four relays. For each relay which will be used in the system, three things must be programmed:

1 To which terminal (10-41) does the relay belong
2 Of what type (0-3) is the relay
3 How long is the time out (0-225) for the relay

The relay types are (see features 09 and 10 in section 6.1.5):

0 = CALL-relay
1 = M-relay
2 = CALL-relay, where the time out also disconnects the speech connection, if it is still on
3 = M-relay, where the time out also disconnects the speech connection, of it is still on.

The time out is the operation time of the relay in seconds. The longest time constant is thus 255 s (4 min 15 s). The initial value is 0 s, which means that the relay will be on until the speech connection is manually ended.

6.1.8 THE TIME

The standard system clock is a software clock, which will run as long the power is on. If a mains break occurs, the time will be cleared, and started from 00:00 when the power is back.

The optional relay tome clock card RTC contains a rechargeable battery, and its hardware clock will run even during a power break lasting for not more than about 48 hours.

The system will automatically know if the RTC is connected or not, and use the software clock if it isn't. The setting of the correct time is done in the same way in both cases, see section 6.2.8.

(Alternatively the time of the clock can be set from any priority terminal, e.g. from connection number 10, which has the priority right without programming, see Instructions for use in chapter 7.)

SL 1000 compact system

Use pencil

CUSTOMER

	Physical number	Free number 1	2	Name	Pair numbres		Room number	Terminal model	Special feature of terminals feature 16	Member of group calls 01	02	Preprogrammed short code and transfer numbers (use physical numbers 10-41) Short code 1	2	Transfer 3	1	2	Special features of terminals 00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
Emergency all call	00																														
Group call	01																														
Group call	02																														
All call	03																														
Conn. card 1	10																														
	11																														
	12																														
	13																														
Conn. card 2	14																														
	15																														
	16																														
	17																														
Conn. card 3	18																														
	19																														
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Conn. card 7	34																														
	35																														
	36																														
	37																														
Conn. card 8	38																														
	39																														
	40																														
	41																														

6.2 THE PROGRAMMING INSTRUCTIONS AND THE PROGRAMMING DIAGRAM

In the user programming from the programming terminal the physical numbers are always used, that is the connection numbers 10-41 for the terminals and numbers 00-03 for the emergency all call, the group calls and the all call.

A standard desk top terminal with a display is used as the programming terminal, by connecting it to the programming socket, which is connected to the programming connector of the processor card and installed close to the central cabinet.

The starting and ending key sequences of the programming

When the programming terminal is connected to the central, or at least when any of its keys is depressed, the display will show 9999.

The programming session must then be started with the key sequence **C i M** ↙ **A**.
With each of the keyings **i, M** and ↙ one 9 will disappear, and when the **A** is depressed the display will clear. At the same moment the rest of the system will stop functioning: all speech connections are interrupted and all displays cleared, during which all four LEDs of the programming terminal are lit. After a few seconds, depending on the number of user terminals connected to the central, the LEDs will be put out, and the programming terminal is ready for use.

The programming session must then be ended with the same key sequence **C i M** ↙ **A** . Now each of the keyings **i**, **M** ↙ and **A** will bring one 9 to the display. When the display shows 9999 the displays of all user terminals will be restored, and after a few seconds the system will be ready for use. The programming terminal is disconnected and returned to its normal location of use.

If the programming session is not ended with the ending key sequence, the system must be started by depressing the RESET button of the processor card, or by turning the power off and back on again.

The programming functions

The starting key sequences for the different programmable functions are the following:

C0A	Selecting the numbering system Clearing all programming
C1A	The free numbers
C2A	The group calls
C3A	The short code and transfer numbers
C4A	The features of the individual terminals
C4 ↙	The features of the individual terminals
C5A	The blockings
C6A	The relays
C7A	Setting the time

It is recommended to do the programming in the listed order. It is especially important to do the free numbering programming before programming the short code and transfer numbers.

All the programming key sequences are discussed in section 6.2 , the last page is a Programming Diagram summary, which contains all programming functions. Section 6.3 contains some typical programming examples, which should further help to explain the user programming.

6.2.1 PROGRAMMING THE FREE NUMBERS

When programming the free numbers special attention must be paid to the fact that the same number must not exist more than once in the numbers tables, except that the main and the parallel number of a terminal can be the same. There are three number tables: The main numbers, the parallel numbers and the numbers for the emergency, group and all calls.

The initial contents of these tables are: the main numbers 10-41, the parallel numbers 10-41 and the emergency group and all call numbers 00-03. If, for instance, the main number of connection number 10 is changed to 20, both the main and parallel number of connection number 20 must be altered.

After the programming of the free numbers it is therefore good the check the contents of the tables, to ensure that the same numbers are not programmed for different terminals of for the emergency, group and all calls, since the system may function incorrectly in such cases.

a. Selecting the numbering system

The free numbers can be selected to be 2-4 digits long.

The length of the numbering system is shown by keying:
C0Ai which will display a 2-, a 3- or a 4,

and is altered by keying
C0ADM which sets the numbers to be D digits long, where D = 2, 3 or 4

b. Programming the main numbers

The programming of the main numbers is started by keying:
C1A1i after which the display for 2 second will show "1 10", where the 1 means the main numbers and 10 is the physical connection number for the first user terminal, and after that " the programmed free number ", e.g. " 10".

(If the main numbers have not been programmed, but the numbering system has been changed to be 3 digits long as described in section a, by keying **C0A3M** the display will show "010", and so on.)

The alternative programming keyings, when the programmed number is shown, are:

XXXM where XXX = the new main number (XX or XXXX, if a 2- or 4-digit numbering system)m after which the display steps to the next physical number, which is shown for 1 second, and the corresponding free number (after the physical number 41 the display returns to number 10)
→ which steps to the next physical number
NN i which jumps to the physical number NN = 10-41
i which repeats the present physical number
C which stops the free number programming.

c. Programming the parallel numbers

This is done in the same way as the main numbers, but is started by keying:

C1A2i and the display will for 1 second show "2 10", "2 11", ..., "2 41", "2 10", ..., before showing the programmed parallel number.

d. Programming the numbers for the emergency, group and all calls

This is done as the main numbers, but started with:

C1A3i and the display shows "3 00", "3 01", "3 02", "3 03", "3 00", and so on for 1 second before showing the programmed numbers.

6.2.2 PROGRAMMING THE TYPE OF TERMINAL (feature number 16)

The programming of the type of terminal is started with:

C4 ↗ 16i after which the display will show "0 10", meaning that terminal number 10 is type of 0, an ordinary terminal.

The different type of terminals are:
0 = ordinary terminal (initial setting without programming)
1 = door terminal
2 = program source

and the programming is done with the keying

TM where T = 0, 1 or 2. After this the display will step to the next terminal and its type (after terminal 41 comes number 10).

Other possible keyings are

→ which steps to the next terminal number
NNi which jumps to terminal number NN = 10-41
i which for 1 second shows the number of the feature being programmed (= "16 "), and then repeats the type and the terminal number
C which stops this programming function **C4 ↗**.

(The type of the terminal can also be programmed together with the other features 00-15 of the individual terminals, see section 6.2.5.)

6.2.3 PROGRAMMING THE GROUP CALLS

The two programmable group calls of the system. 01 and 02, are initially empty, that is without members. Adding members (or removing later) is started with:

C2A1i for group call 01
or
C2A2i for group call 02, after which the display will show "0 10", meaning that terminal 10 is not a member of the group.

It is added to the group by keying:

1M

and correspondingly a terminal NN belonging to the group (display showing "1 NN") is taken out of the group by keying:

0M the display will then step to the next terminal number (41 is followed by 10).

Other keying alternatives are:

→ which steps to the next number
NNi which steps to number NN = 10-41
C which stops the group call programming.

6.2.4 PROGRAMMING THE SHORT AND TRANSFER NUMBERS

Each terminal can be given three individual short code call numbers and two transfer numbers. In the programming the physical numbers 00-03 and 10-41 are used, but the corresponding main numbers are stored in memory, if such have been programmed. This means that the programming of the three numbers must be done before the short code number and transfer number programming. Also, of the free numbers are altered later, the programming of the short code and transfer numbers addressing the altered numbers must be done again.

The programming is started with:

C3ATi	where	T = 1	when programming the short code number	1
		2	"	2
		3	"	3
		4	" transfer numbers	1
		5	"	2

after which the display for 1 second show "T 10" and then "the number of type T programmed for terminal 10".

If no number has been programmed the display will show the number of the terminal itself.

A number is programmed by keying:

NNM where NN = 00-03 or 10-41, after which the display steps to the next terminal number (41 is followed by 10).

The keying:

➔ will step to the next terminal number
NNi will step to terminal NN = 10-41
i will show the type and physical number being programmed for 1 second, and then repeat the programmed number
C will stop the special number programming.

6.2.5 PROGRAMMING THE SPECIAL FEATURES OF THE TERMINALS

This programming, where the special features 00-16 of the individual terminals, as listed in section 6.1.5, are programmed, can be done in two alternative ways:

1. One feature at a time for the different terminals, meaning that the special feature columns of the system definition diagram, see last page o section 6.1, are scanned vertically for the terminals 10-41. After terminal 41 comes terminal 10, the feature number staying the same.

2. One terminal at a time for the different features, meaning that the special feature rows of the system definition diagram are scanned horizontally for the features 00-16. After feature 16 comes feature 00 for the next terminal (on the next row). Feature 16 of terminal 41 is followed by feature 00 of terminal 10.

NOTE: Feature number 16 is found in column "Terminal type" in the system definition diagram.

1. Programming one feature at a time, terminal by terminal

The programming is started by keying:

C4↗FFi where FF = 00-16 = the number of the feature to be programmed. The display will show 1 10" or "0 10" depending on whether the selected feature FF is set (1) or not (0) for terminal number 10.

For features 00-15 the programming keying is

1M if the feature is to be set
0M if the feature is to be cleared

and for feature 16

0M
1M or
2M (see section 6.2.2), after which the display steps to the next terminal number.

The other keying alternatives are:

→ which steps to the next terminal number (41 is followed by 10)
NNi which jumps to terminal NN = 10-41
i which for 1 second shows which feature number 00-16 is being programmed
C which stops the programming of the features.

2. Programming all features for each terminal at a time

The programming is started by keying:

C4ANNi where NN = 10-41 = the number of the terminal from which to start the programming: the display will show "00 1" or "00 0" depending on whether feature 00 is set (1) or not (0) for the terminal selected.

NOTE: In alternative 1 the number of the terminal was at the right hand end of the display, in this alternative 2 the number of the feature is at the left hand end.

The keying alternatives are:

1M if the feature (00-15) is to be set
0M if the feature (00-15) is to be cleared
0M if the terminal type (feature 16) is to be altered
1M if the terminal type (feature 16) is to be altered
2M if the terminal type (feature 16) is to be altered

→ which steps to the next feature (and terminal number after feature 16; feature 16 of terminal 41 is followed by feature 00 of terminal 10)
i which for 1 second shows the terminal number being programmed
NNi which steps to feature 00 of terminal NN = 10-41
C which stops the programming of the features.

6.2.6 PROGRAMMING THE BLOCKINGS

The programming of the blockings is started with:

C5ANNi where NN = 10-41 = the number of the terminal whose blockings are to be programmed. The display will then show "NN 1" for 1 second, meaning that the call blockings from terminal NN to the terminals of connection card number 1 (terminals 10-13) are being programmed, and then "XXXX", where X = 0, if terminal NN is allowed, X = 1, if not allowed to call the terminal in question.

The keying alternatives are now:

XXXXM if one wants to change the blockings (X = 0 or 1), after which the display will step to the next connection card number 2-8, and to connection card 1 of the next terminal after card number 8
→ which steps to the next connection card (or terminal)
i which for 1 second shows which terminal and connection card is being programmed
NNi which steps to terminal NN = 10-41 and connection card 1
C which stops the programming of the blockings.

6.2.7 PROGRAMMING THE RELAYS

The programming connected with the relay card of the central is started with:

C6A after which the display will show "1 NN", meaning that data number 1 for the first relay (of four) is 1 = NN, that is the relay belongs to terminal NN. The initial value is NN = 10,

which can be changed by keying

NNM after which the display will show "2 0", meaning that the first relay is of type 0 (data number 2).

This can be changed by keying:

TM where T = 0, 1, 2 or 3, after which the display will show "3000", meaning that data number 3, which is the time constant for the relay, is 0 seconds. Possible time constant values are 000, 001, ..., 255 s and the setting must always be done using three digits, that is e.g.

009M if the time constant is to be set to 9 s. After this the display steps to the data number of the second relay, and so on.

Keying alternatives, besides the programming keying (2, 1 or 3 digits plus M) are;
i which for 1 second shows which relay (1-4) is being programmed
→ which steps to the next data (and relay after data number 3)
Ri which jumps to data number 0 of relay R = 1-4
C which stops the programming of the relays.

6.2.8 PROGRAMMING THE TIME

Setting the time of the system clock is started with:

C7A which will show the time, e.g "1430",

If this is correct,

1430M will set the clock to 2:30 pm
C will stop the programming, if it is incorrect.

When the M-button is depressed, the clock will start running from the hours and minutes set, the seconds being 00.

6.2.9 CLEARING OF ALL PROGRAMMING (THE EEPROM-MEMORY)

All programming that has been done can be cleared, if needed, after which the system will work in its basic mode, see first paragraph of chapter 6.

The clearing is done with the keying sequence:

C0A 0000 ↗ 0000M after which the LEDs of the programming terminal will be lit for about 15 seconds, during which the EEPROM is initialized. When the LEDs are put out the programming can be continued.

Normally the clearing of the programming does not have to be done. It is done only if, for some reason, one wants to start the programming from the beginning, and in certain fault situations, see the Faultfinding guide in chapter 4.

Function key sequence	Display for 1s	Continuous display	Explanation and programming key sequence alternatives
C i M A		9999	→ □ Starting sequence of the programming. Display is emptied.
C 0 A i **C 0 A D M**		D	D = 2, 3 or 4 = displaying the length of the numbering system D = 2, 3 or 4 = setting the length of the numbering system
C 1 A N i Free numbers	N 10 N 10 N 11 N 11 N 23 N 24	PP 66 77 77 23 24	PP (PPP, PPPP) = Free number of type N programmed for physical number 10: N = 1 = main numbers, N = 2 = parallel numbers, N = 3 = emergency/group/all call numbers **99M** sets a new free number and steps to the next number **i** displays for 1 s the physical number being programmed 23 **i** jumps to another physical number → steps to the next physical number **C** stops the function
C 2 A G i Group calls		K 10 0 10 1 11 1 12 1 30 0 31	Terminal 10 belongs (K = 1) / does not belong (K = 0) to group G: G = 1 = group call 01, G = 2 = group call 02 **1M** adds the number to the group and steps to the next number **0M** removes the number from the group and steps to the next number **30 i** jumps to another physical number → steps to the next physical number **C** stops the function
C 3 A T i Short code and transfer numbers	T 10 T 10 T 11 T 11 T 28 T 29	NN 10 10 10 40 11	NN = 10-41 = the short code/transfer number of type T for terminal 10: T = 1 = short code 1, T = 2 = short code 2, T = 3 = short code 3, T = 4 = transfer number 1, T = 5 = transfer number 2 **41M** sets a new number and steps to the next number **i** shows the terminal number for 1 s **28 i** jumps to another terminal number → steps to the next terminal number **C** stops the function
C 4 F F i Feature FF of the individual terminals	FF	K 10 1 10 0 11 0 12 0 13 1 18 1 18	Feature FF = 00-15 is set (K = 1) / or not (K = 0) for terminal 10. When FF = 16 the value of K can be 0, 1 or 2 **0M** clears and steps to next terminal (when FF = 16 one can set **1M** sets and steps to next terminal 0M, 1M or 2M = terminal type) → steps the next terminal number **18 i** jumps to another terminal number **i** shows for 1 s which feature is being programmed **C** stops function
C 4 A N N i Features of the individual terminals (terminal by terminal)	NN 12	00 K 00 1 01 0 02 0 03 1 00 1 00 1 00 1	Feature 00 is set (K = 1) / or not (K = 0) for terminal number NN (10-41) **0M** clears and steps to next feature (when the display is 16 K, **1M** sets and steps to next feature one cab set 0M, 1M or 2M) → steps to the next feature (and to the next terminal after 16 K) **12 i** jumps to feature number 00 of another terminal number **i** shows for 1 s which terminal is being programmed **C** stops the function
C 5 A N N i Blockings	NN 1 NN 1 NN 2 NN 3 30 1 30 1 30 2	XXXX XXXX XXXX XXXX XXXX XXXX XXXX	Terminal number NN = 10-41 is allowed (X = 0) / not allowed (X = 1) to call the terminals of connection card 1 (= terminals 10-13) **0010M** terminal NN is not allowed to call number 12 (3. number on card 1) → steps to the next card (and to the next terminal after NN 8) **30 i** jumps to terminal number 30 **i** shows for 1 s which terminal and card is being programmed **1000M** terminal 30 is not allowed to call terminal number 10 **C** stops the function

C 6 A Relays	2 4	1 NN 1 NN 2 T 3 S S S 1 NN 1 NN 2 T 2 T	Data number 1 of the first relay: belongs to terminal NN **20M** relay 1 belongs to terminal 20 **1M** relay 1 is of type T = 1 (T:0 = CALL, 1 = M, 2 = CALL + disconnection, 3 = M + disconnection) **009M** relay 1 has a 9 s time constant; steps to relay 2 **4 i** jumps to relay number 4 → steps to the next data **i** shows for 1 s which relay is being programmed **C** stops the function
C 7 A Time		1530	Shows the time of the system clock (15:30 = 3:30 p.m.), after which e.g: **0800M** sets the time or **C** stops the function
C 0 A 0000 ↗ 0000 M			Clears all programming, which will take about 15 s.
C i M ↗ A			→ 9 9 9 9 Ending sequence of the programming

6.3 PROGRAMMING EXAMPLES

NOTE: The starting and ending sequence **CiM ↗A** is needed only at the beginning and end of the whole programming session, not before and after each different programming function.

1 **a** The numbering system is a 3-digit system

b Connection numbers 10-13 are given the main numbers 200, 222, 400 and 387

c Connection number 13 is given the parallel number 333

d The emergency all call is given the number 999, the group calls the numbers 901 and 902, and the all call the number 900.

Function sequence **CiM ↗ A**	Display for 1 s	Display then	Programming sequence
a: **C0A3M**			
b: **C1A1i**	1 10	010	**200M**
	1 11	011	**222M**
	1 12	012	**400M**
	1 13	013	**387M**
	1 14	014	**C**
c: **C1A2i**	2 10	010	**13i**
	2 13	013	**333M**
	2 14	014	**C**
d: **C1A3i**	3 00	000	**999M**
	3 01	001	**901M**
	3 02	002	**902M**
	3 03	003	**900M**
	3 00	999	**C**
CiM ↗ A			

2 The types of the terminal (feature number 16) are programmed such that all terminals are ordinary terminal except connection numbers 17 and 19, which are door terminals, and connection number 25, to which a program source is connected.

Function sequence	Display for 1 s	Display then	Programming sequence
CiM ↗ A		0 10	**17i**
C4 ↗ 16i		0 17	**1M**
		0 18	→
		0 19	**1M**
		0 20	**25i**
		0 25	**2M**
		0 26	**C**
CiM ↗ A			

3 The connection numbers 11, 12, 14 and 21 are made members of group call 01, after which the programming is checked:

Function sequence	Display for 1 s	Display then	Programming sequence
CiM ↗ A			
C2A1i		0 10	→
		0 11	**1M**
		0 12	**1M**
		0 13	→
		0 14	**1M**
		0 15	**21i**
		0 21	**1M**
		0 22	**10i**
		0 10	→
		1 11	→
		1 12	→
		0 13	→
		1 14	**21i**
		1 21	**C**
CiM ↗ A			

4 Connection number 17 is given the following special numbers: short code number 1 = connection number 21, short code number 2 = connection number 10, transfer number 1 = connection number 10.

Function sequence	Display for 1 s	Display then	Programming sequence
CiM ↗ A	1 10	10	**17i**
C3A1i	1 17	17	**21M**
	1 18	18	**C**
C3A2i	2 10	10	**17i**
	2 17	17	**10M**
	2 18	18	**C**
C3A4i	4 10	10	**17i**
	4 17	17	**10M**
	4 18	18	**C**
CiM ↗ A			

5 The special features of the terminals are programmed as follows:
- terminals 12 and 13 are given the priority right (feature number 00), but it is taken away from terminal 10, which has it initially
- terminal 11 is not allowed to make group and all calls (feature number 01)
- terminal 21 cannot be put into the "follow me" state (feature number 05)

Function sequence	Display for 1 s	Display then	Programming sequence
CiM ↗ A			
C4A10i	10	00 1	**0M**
		01 0	**11i**
		00 0	→
		01 0	**1M**
		02 0	**12i**
		00 0	**1M**
		01 0	**13i**
		00 0	**1M**
		01 0	**21i**
		00 0	→
		01 0	→
		02 0	→
		03 0	→
		04 0	→
		05 0	**1M**
		06 0	**C**
CiM ↗ A			

6 The terminals 11 and 12 are to be prevented from calling terminal 10, and terminals 12 and 13 from calling number 17:

Function sequence	Display for 1 s	Display then	Programming sequence
CiM ↗ A			
C5A11i	11 1	0000	**1000M**
	11 2	0000	**12i**
	12 1	0000	**1000M**
	12 2	0000	**0001M**
	12 3	0000	**13i**
	13 1	0000	→
	13 2	0000	**0001M**
	13 3	0000	**C**
CiM ↗ A			

7 The relay functions and the special features of the individual terminals needed in conjunction with them, are programmed as follows:

- a CALL-relay belongs to terminal 13 (feature 09), which operates as long as the speech connection is on.
  An M-relay belongs to the same terminal (feature 10), and has a time constant of 15 seconds, but it does not disconnect the speech connection if it is still on
- an M-relay belongs to terminal 14 with a 15 s time constant which disconnects the speech connection if still on.

Function sequence	Display for 1 s	Display then	Programming sequence
CiM ↗ A			
C4 ↗ 09i		0 10	**13i**
		0 13	**1M**
		0 14	**C**
C4 ↗ 10i		0 10	**13i**
		0 13	**1M**
		0 14	**1M**
		0 15	**C**
C6A		1 10	**13M**
		2 0	→
		3000	→
	2	1 10	**13M**
		2 0	**1M**
		3000	**015M**
	3	1 10	**14M**
		2 0	**3M**
		3000	**005M**
	4	1 10	**C**
CiM ↗ A			

8 The time of the clock is set to 14:37, because it is 2 minutes ahead (the M is depressed when the correct time is 14:37:00):

Function sequence	Display for 1 s	Display then	Programming sequence
CiM ↗ A			
C7A		1439	**1437M**
CiM ↗ A			

7. INSTRUCTIONS FOR USE

TIME *		
Display of the time	**i** or **M**	The time will be displayed for 8 seconds.
Setting the time	**M i 1215**	The time is set to 12:15. Can be done only by from priority terminals.
CHECKING TERMINAL NUMBERS *		
Own main number Own parallel number Own physical number	**i M** **i MM** **i MMM**	If no main and/or parallel numbers have been programmed, the physical number is shown.
MAKING A CALL		
Normal call	**10**	If the dialled terminal is free the CALL-LED is lit and a short tone is heard.
Short code call, for a number previously stored into one of the three memories (programming sequence below)	**1** ↙ or **2** ↙ or **3** ↙	If the terminal is busy the busy tone is heard. If the terminal is in the A-state an alarming tone is heard. If the terminal is in the transfer state the call is transferred to the transfer number.
Recall, reconnects your latest connection or the last one you tried to make	↙	If an info code is set it will be shown and the busy tone will be heard.
Clear	**C**	Clears the call.
Checking the short code numbers	**0** ↙ **1** **0** ↙ **2** **0** ↙ **3**	The previously programmed short code numbers are displayed.
Programming the short code numbers	**0** ↙ **1 12** **0** ↙ **2 40** **0** ↙ **3 27**	The new number replaces the old one, if already programmed.
CHECKING YOUR LATEST CONNECTION *		
Displays your latest connection or attempt to make one	**i**	The number of the terminal you last were in connection with, or tried to connect, is displayed.

NOTE:
Setting the info code, the call alert state (A-state) and the transfer state are alternatives.

SETTING THE INFO CODE *		
Setting an info code in your own terminal	**i** + four numbers	The info code can be seen on your own and every caller's display. Codes beginning with 0, 1, 2, 3, 8 and 9 can be set.
	Special codes: **i 4** **i 5** **i 6** **i 7**	Display will show: 0004 = e.g. in a meeting 0005 = e.g. elsewhere in the house 6666 = busy for a short while 7777 = busy
Remote setting of the info code	**i** + four numbers ➔ **12**	First set the info code. Then move it to the desired terminal.
Remote clearing of the info code	➔ **12** **C**	Move an "empty" info code to the desired terminal. The info code disappears from the display.
Clearing the info code		
SETTING THE A-STATE *		
Setting of the A-state	**i A**	The A-LED is lit. The incoming calls are not connected, but start alarming.
	A or **C**	Accept the call with the A-button, or clear the alarming with C.
Clearing of the A-state	**C**	The A-LED is put out.
SETTING OF THE TRANSFER STATE *		
Preprogrammed call transfer	➔ **12**	The incoming calls are transferred to the number set, which remains to the number set, which remains in the display. The➔-LED is lit.
Resetting of the call transfer	**i** ➔	Resetting of the transfer state to the previously set number.
Follow me	➔➔ **10**	Your own calls are transferred to the number from which the setting is done (10 = your own number)
Clearing the transfer state	**C**	The➔ -LED is put out, and the display is cleared.

CALL BACK REQUEST *		
Leaving a call back request	**10 i**	If the called person does not answer, is busy or has set an info code, finish the call attempt by depressing the **i**-button. The i-LED is lit on the called terminal, and a short tone is heard. Your number is stored into the call back request memory.
Cancelling a call back request	**10 C**	You can cancel a call back request which you have left by calling the number again, and ending the call with the **C**-button.
Answering a call back request	**A**	Depress the **A**-button when the **i**-LED is lit. You'll be connected to the number shown in your display.
Clearing a call back request	**C**	If you do not want to answer the call back request shown, clear it with **C**-button.
Scanning the call back request	**i i** → **...** →	With the starting key sequence **i i** you can check if you have several call back requests in queue. With the →-button the next one will be displayed. If you wish to, you can answer the call back request shown with the **A**-button.
	A	
	C	Ending the scanning.
Leaving a call back request for yourself	**A**	If you depress the A during a call you'll leave yourself a call back request. At the same moment your info code will be set to "6666", meaning "busy for a short while". This can be used e.g. if an intercom call arrives during an external telephone call: the caller will see your info code 6666, and you can answer your call back request to the caller when the telephone call is over.
	10 A	Can also be used as a "note" for yourself to later renew the call to the person you did not reach. In this case you should clear your code 6666 at once.
Remote scanning of the call back requests	**i i 12** → **...** →	The call back requests left at any terminal can be scanned from any other terminal, but not answered nor cleared.
ENQUIRY CALL		
Making an enquiry call	**41** or **1** ↙ **2** ↙ or **3** ↙	A number or a short code dialled during a call will open a new connection, while the original connection stays queuing for a maximum duration of 30 s, during which time it can be reconnected by depressing the **C**.
	C	
Transferring an enquiry call *	→	or the original connection is transferred to the enquiry number by depressing the →.

PRIORITY CALL *		
Making a priority call	**41** **M**	A terminal, to which the priority right has been given, can interrupt an ongoing call with the M-button. The other party of the original connection stays queuing for a maximum duration of 30 s. If the priority call is ended with the **C**-button during this time, the original connection will be resumed.
MICROPHONE MUTE		
Microphone mute	**PRIV** or **I∅** in some models	The microphone is closed, and the CALL-LED put out, for the time the button is kept depressed, thus your voice cannot be heard at the other end.
SIMPLEX		
Speech direction control	◄	For manual control of the speech direction. Press to talk, release to listen.
OPTIONAL FUNCTIONS		
MUSIC CHANNEL	29	A program source, such as a radio or a tape recorder, can be connected to any number.
RELAY CONTROL	**M**	Depressing the M-button during a call activates an assigned relay.
GROUP AND ALL CALLS		
Emergency all call	**00** or the programmed number	Can be made from priority terminals. Disconnects all ongoing calls and connects to all terminals.
Group calls	**01** or **02** or the programmed number	Connects to all terminals belonging to the group, but does not disconnect ongoing call.
Answering a group call	**A**	Depressing the A-button in any terminal belonging to the group will make a connection between the maker of the call and the answerer.
	03 or the programmed number	Connects to all terminals, except to those which have a call going on, or the info code 7777 set.
Answering an all call	**A**	As answering a group call.

ALARM TIMES *		
Setting an alarm time	**MM 1230**	The terminal will give an audible alarm for 15 s at 12:30.
Displaying and scanning alarm times set times	**MM ➔ ... ➔**	The alarm times set for the terminal will be displayed one by one.
Clearing alarm times set	**A**	The alarm time shown during the displaying and scanning can be cleared with the **A**-button.
	C	Ending the scanning.
Setting a repeating alarm time	**MMM 1600**	
Displaying and scanning of repeating alarm times set	**MMM ➔ ... ➔**	As the one-time alarm times, but the repeating alarm times will be repeated at the same time every day.
Clearing repeating alarm times set	**A**	
	C	Ending the scanning.

*) only from terminals with display

SL 1000 compact system

Use pencil

CUSTOMER

	Physical number	Free number 1	2	Name	Pair numbres		Room number	Terminal model	Special feature of terminals feature 16	Member of group calls 01	02	Preprogrammed short code and transfer numbers (use physical numbers 10-41) Short code 1	2	Transfer 3	1	2	Special features of terminals 00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
Emergency all call	00																														
Group call	01																														
Group call	02																														
All call	03																														
Conn. card 1	10																														
	11																														
	12																														
	13																														
Conn. card 2	14																														
	15																														
	16																														
	17																														
Conn. card 3	18																														
	19																														
	20																														
	21																														
Conn. card 4	22																														
	23																														
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conn. card 5	26																														
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	28																														
	29																														
Conn. card 6	30																														
	31																														
	32																														
	33																														
Conn. card 7	34																														
	35																														
	36																														
	37																														
Conn. card 8	38																														
	39																														
	40																														
	41																														

Terminal type = special feature 16
0 = ordinary terminal
1 = door terminal
2 = program source
3 = TLI
4 =
Special features 00-15
00 The terminal has the priority right
01 Not allowed to make group and all calls
02 Always in the A-state (call alert state)
03 Program channel listening is not interrupted for incoming calls
05 "Follow me"-setting is not possible for this terminal
06 All incoming calls are call requests
07 All outgoing call are call requests
08 The terminal is equipped with a relay (M-TAR-relay)
09 The terminal has a CALL-relay on the relay card
10 The terminal has a M-relay on the relay card
11
12
13
14
15

Blockings

FILL SQUARE IF TERMINAL ON ROW IS NOT ALLOWED TO CALL TERMINAL IN COLUMN

	1				2				3				4				5				6				7				8			
	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
10																																
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40																																
41																																

Relays (on relay card)	Relay number 1	2	3	4
1 Relay belongs to terminal 10-41				
2 Relay type*				
3 Time out in seconds (s)				
* = 0 = CALL-relay				
* = 1 = M-relay				
* = 2 = CALL-relay, call also ends after time out if still on				
* = 3 = M-relay, call also ends after time out if still on				

Function key sequence	**Display for 1s**	**Continuous display**	**Explanation and programming key sequence alternatives**
C i M A		9999	→ ☐ Starting sequence of the programming. Display is emptied.
C 0 A i **C 0 A D M**		D	D = 2, 3 or 4 = displaying the length of the numbering system D = 2, 3 or 4 = setting the length of the numbering system
C 1 A N i	N 10	PP	PP (PPP, PPPP) = free number of type N programmed for physical number 10: N = 1 = Main numbers, N = 2 = parallel numbers N = 3 = emergency/group/all call numbers **99M** sets a new free number and steps to the next physical number **i** displays for 1 s the physical number being programmed **23 i** jumps to another physical number → steps to the next physical number **C** stops the function
Free numbers	N 10 N 11 N 11 N 23 N 24	66 77 77 23 24	

C 2 A G i Group calls		K 10 0 10 1 11 1 12 1 30 0 31	Terminal 10 belongs (K = 1) / does not belong (K = 0) to group G: G = 1 = group call 01, G = 2 = group call 02 **1M** adds the number to the group and steps to the next number **0M** removes the number from the group and steps to the next number **30 i** jumps to another physical number **→** steps to the next physical number **C** stops the function
C 3 A T i Short code and transfer numbers	T 10 T 10 T 11 T 11 T 28 T 29	NN 10 10 10 40 11	NN = 10-41 = the short code/transfer number of type T for terminal 10: 1 = short code 1, T = 2 = short code 2, T = 3 = short code 3, T = 4 = transfer number 1, T = 5 = transfer number 2 **41M** sets a new number and steps to the next number **i** shows the terminal number for 1 s **28 i** jumps to the next number **→** steps to the next terminal number **C** stops the function
C 4 ↗ F F i Feature FF of the individual terminals	FF	K 10 1 10 0 11 0 12 0 13 1 18 1 18	Feature FF = 00-15 is set (K = 1) / is not set (K = 0) for terminal number 10. When FF = 16 the value of K can be 0, 1 or 2 **0M** clears and steps to next terminal (when FF = 16 one can set **1M** sets and steps to next terminal 0M, 1M or 2M = terminal type) **→** steps to the next terminal number **18 i** jumps to another terminal number **i** shows for 1 s which feature is being programmed **C** stops the function
C 4 A N N i Features the individual terminals (terminal by terminal)	NN 12	00 K 00 1 01 0 02 0 03 1 00 1 00 1 00 1	Feature 00 is set (K = 1) / is not set (K = 0) for terminal number NN (10-41) **0M** clears and steps to next feature (when the display is 16 K, can set 0M, **1M** sets and steps to next feature 1M or 2M and to the next terminal) **→** steps to the next feature after 16 K) **12 i** jumps to feature number 00 of another terminal number **i** shows for 1 s which terminal and card is being programmed **C** stops the function
C 5 A N N i Blockings	NN 1 NN 1 NN 2 NN 3 30 1 30 1 30 2	XXXX XXXX XXXX XXXX XXXX XXXX XXXX	Terminal number NN = 10-41 is allowed (X = 0) / is not allowed (X = 1) to call the terminals of connection card 1 (terminals 10-13) **0010M** terminal NN is not allowed to call to number 12 (3. number on card 1) **→** steps to the next card (and the next terminal after NN 8 **30 i** jumps to terminal number 30 **i** shows for 1 s which terminal and card is being programmed **1000M** terminal 30 is not allowed to call terminal number 10 **C** stops the function
C 6 A Relays	2 4	1 NN 1 NN 2 T 3 S S S 1 NN 1 NN 2 T 2 T	Data number 1 of the first relay; belongs to terminal NN **20M** relay 1 belongs to terminal 20 **1M** relay 1 is of type T = 1 (T:0 = CALL, 1 = M, 2 = CALL-disconn., 3 = M+disconn.) **009M** relay 1 has a 9 s time constant: steps to relay 2 **4 i** jumps to relay number 4 **→** steps to the next data **i** shows for 1 s which relay is being programmed **C** stops the function
C 7 A Time		1530	Shows the time of the system clock: (15:30 = 3:30 p.m) after which e.g. **0800M** sets the time **C** stops the function
C 0 A 0000 ↗ 0000 M			Clears all programming, which will take about 15 s
C i M ↗ A			**→** 9999 Ending sequence of the programming