



# TouchLine Compact Software 36.21



SI 1668 /04-99

## Function Reference



# Table of contents

---

## 1. INTRODUCTION

1.1. CONTEXT .....	7
1.2. TERMINOLOGY .....	7

## 2. CONVERSATION

2.1. IDLE STATION .....	9
2.2. DIALING .....	9
2.2.1. Number Series .....	9
2.2.2. Direct Access to Own Secretary .....	9
2.2.3. Direct Access Station (D10) .....	9
2.2.4. Direct Access from Substation .....	10
2.2.5. Direct Access from Special Keys .....	10
2.2.5.1. C-key .....	10
2.2.5.2. M-key .....	10
2.2.5.3. Handset Off .....	10
2.2.6. External numbers .....	10
2.3. CALL FORWARDING .....	11
2.3.1. Secretary (Preset Transfer) .....	11
2.3.2. Follow Me and Call Forwarding .....	11
2.4. CONVERSATION .....	12
2.4.1. Connect Tone .....	12
2.4.2. Microphone Live Indicator .....	12
2.4.3. Notice Tone .....	12
2.4.4. Speech Switching .....	12
2.4.4.1. Duplex .....	12
2.4.4.2. Simplex .....	12
2.4.4.3. Open Duplex .....	12
2.4.4.4. Handset off/on .....	12
2.4.5. Extra Action Digits .....	13
2.4.5.1. Microphone Mute .....	13
2.4.5.2. Transfer to Preprogrammed Number (Pager) .....	13
2.4.5.3. Inquiry and Transfer .....	14
2.4.5.4. Remote Control .....	14
2.4.5.5. Call (Me) Back .....	14
2.4.5.6. Transfer to Secretary .....	14
2.5. CANCEL .....	15
2.5.1. C-key .....	15
2.5.2. Handset on .....	15
2.5.3. Time-out on Conversation .....	15
2.5.4. Call Me Back .....	15
2.5.5. Priority .....	15
2.6. CALL RESTRICTIONS .....	16
2.6.1. Private Mode .....	16
2.6.2. Access Level .....	16
2.6.3. Non-existing Access Codes .....	16
2.6.4. System Programming Mode .....	16
2.6.5. Group Restrictions .....	17
2.7. BUSY .....	18
2.7.1. Camp On Busy .....	18

2.7.2. Call Back .....	18
2.7.3. Busy Override.....	19
2.7.3.1. Preference .....	19
2.7.3.2. Priority.....	19
2.7.3.3. Levels .....	19

### 3. PHYSICAL DEVICES

3.1. STATIONS .....	21
3.1.1. Normal Station.....	21
3.1.2. Power Amplifier Station .....	21
3.1.3. Door Station .....	21
3.1.4. Simple Telephone .....	22
3.1.5. Recording Device .....	22
3.2. DEVICES .....	23
3.2.1. Dial Pulse Subscriber (PNCI and Pager Interface).....	23
3.2.1.1. Dialing.....	23
3.2.1.2. Handset Mode .....	23
3.2.1.3. Transfers.....	23
3.2.1.4. Answer (Meet Me) .....	23
3.2.1.5. Incoming calls .....	23
3.2.2. Tie Line (FLP).....	23

### 4. FUNCTIONS

4.1. GROUP CALLS.....	25
4.1.1. General.....	25
4.1.1.1. Programmable Groups .....	25
4.1.1.2. Busy Override .....	25
4.1.1.3. Programmable Mutual Exclusion .....	25
4.1.1.4. Programmable Behavior .....	25
4.1.1.5. Internal/external Signal Source.....	25
4.1.1.6. Use of Speech Channels .....	25
4.1.2. Voice Paging .....	26
4.1.3. Door Bell.....	26
4.1.4. Time Signal .....	26
4.1.5. Priority Voice Paging .....	27
4.1.6. Alarm Call.....	27
4.2. ANSWER (MEET ME).....	28
4.3. AUDIO PROGRAMS .....	29
4.3.1. General.....	29
4.3.1.1. Handset .....	29
4.3.1.2. Cancel Tones.....	29
4.3.1.3. Permanent Storage.....	29
4.3.2. Program Selection.....	30
4.3.3. Program Off.....	30
4.3.4. Program Step .....	30
4.3.5. Remote Program Setup.....	30
4.4. PROGRAM CONFERENCE .....	31
4.5. CALL FORWARDING .....	32
4.5.1. General.....	32
4.5.1.1. Blinks and Bleeps .....	32
4.5.1.2. Storage .....	32
4.5.1.3. Function Tones.....	32
4.5.2. Preset Forwarding (Secretary) .....	33

4.5.3. Follow Me .....	33
4.5.4. Call Forwarding .....	33
4.5.5. Cancel Forwarding (Station Reset) .....	33
4.5.6. Remote Cancel Forwarding.....	33
4.6. CALL NUMBER TRANSLATIONS .....	34
4.6.1. Direct Transfer.....	34
4.6.2. Group Hunt.....	34
4.6.3. Transferable Call .....	34
4.6.4. External Transfer .....	34
4.7. DIGIT DATA TRANSMISSION.....	35
4.8. SYSTEM MAINTENANCE .....	36
4.8.1. Program Own D10.....	36
4.8.2. Indicate Own number .....	36
4.9. REMOTE CONTROL .....	37
4.9.1. General on I/O.....	37
4.9.2. Call Pickup .....	37
4.10. LINE MONITORING.....	38
4.10.1. Line checks .....	38
4.10.1.1. ab-wires .....	38
4.10.1.2. cd-wires .....	38
4.10.2. Reports.....	38
4.10.2.1. (S)LIM format.....	38
4.10.2.2. MPC format.....	38
4.10.2.3. Remote control output .....	38

## 5. SERIAL DATA CHANNEL

5.1. DATA RELATED FUNCTIONS .....	39
5.1.1. E11 Lamp test .....	39
5.1.2. E12 Reset.....	39
5.1.3. E14 Call Request .....	39
5.1.4. E15 Intelligent station identification .....	40
5.1.5. E17 Autoload from Station .....	40
5.1.6. E43 Dump Tables on Serial Port.....	40
5.2. TRANSMITTED DATA .....	41
5.3. RECEIVED DATA .....	42
5.3.1. Commands .....	42
5.3.1.1. Conversation Setup .....	42
5.3.1.2. Cancel.....	42
5.3.1.3. Memory Read and Write.....	42
5.3.1.4. Table Dump .....	42
5.3.1.5. Retransmit .....	42
5.3.1.6. Program setup .....	42
5.3.1.7. Tone setup.....	42
5.3.1.8. Remote control (door open).....	42
5.3.1.9. Line error status.....	42

## 6. CHANGE LOG

6.1. Version X30 (1991-08-13).....	43
6.2. Version X30 (1991-10-23).....	43
6.3. Version 30.0 (1991-11-06).....	43
6.4. Version 36.2 (1996-07-06).....	44

## 7. INDEX

# 1. INTRODUCTION

---

## 1.1. CONTEXT

The specification was written with two major concerns: The "new" P32 should be functionally identical to the "old" P32, and new functions should be PAMEX MPC similar as far as possible.

## 1.2. TERMINOLOGY

### **Access code**

Access code is the most general way to say that a user must dial a few digits (code) to activate (access) an intercom station or function.

An access code can be 1 to 4 digits: 0 to 9 and A to F (M+0 to M+5).

### **Station number**

A simpler way to say "station access code", when talking about stations. A station number can be dialed on the 0-9 keypad. i.e. no fancy use of hex digits.

### **Success tone**

(dut-dut-dut), similar to "attention tone" in transfers (400 Hz).

### **Failure tone**

(brrrr), similar to "ringing tone" in *private*, but only one short ring (400 Hz).

### **Autoload**

When the exchange is installed and commissioned, all programmable tables are loaded with standard values. The basic autoload corresponds to the "old" P32.

### **EEPROM**

Electrically Erasable Programmable Read Only Memory: The memory technology used for storage of programmable values, i.e. number series, function options, D10 keys, transfers etc. Most important: the contents of the memory survives power off. Note that the technology is limited to 10 000 change operations.

### **Programming**

Changing the system's tables by dialing special (protected) function numbers. Most programming codes are described in the "Programming Reference".



## 2. CONVERSATION

---

### 2.1. IDLE STATION

An idle station can have some activity:

- *audio program* on
- *group calls* come and go (interrupting a program)
- blinks in the station LED every second, bleep in the speaker every minute, as *reminder* of a *transfer* or *call me back*.

### 2.2. DIALING

Dialing proceeds this way:

- Station is idle
- The user presses the first digit
  - The system checks if the number is complete, else a dialing tone is heard.
- The user dials the required number of digits
  - The dial tone is removed briefly to indicate reception of each digit.  
When the last digit is pressed, the system continues the dial tone until the digit is released. This is required because a conversation can not start with a digit key pressed (sending a tone from the station).
- The user releases the last digit in the number
  - The exchange executes the number, i.e. a conversation or a function.  
Conversations are always started with a connect tone, and terminated by a disconnect tone. Functions are usually started with an attention tone, and terminated by a success or failure tone.

Each digit must be pressed within 5 seconds, and the last digit must be released within 5 seconds.

Dialing can be performed with the handset on or off.

Dialing an existing number may fail, either due to call restrictions programmed in the exchange, or a missing subscriber line board. These cases are terminated immediately with a failure tone.

#### 2.2.1. Number Series

The exchange has a programmable number series, both for stations and functions. All access codes can be 1 to 4 digits. Hexadecimal digits are allowed.

#### 2.2.2. Direct Access to Own Secretary

A station can reach it's own secretary by dialing an access code (number 9 in MPC autoload).

#### 2.2.3. Direct Access Station (D10)

All stations can have a D10 direct access unit. The user can program the 10 keys to dial any number in the exchange, see page 36.

If a user don't program his own D10, a system common D10 programming can be used.

### 2.2.4. Direct Access from Substation

A substation is considered to be a limited direct access station, where the numbers are stored in the station's D10 table. The correspondence between keys and D10 keys are:

Signal	Substation key	Modified substation	D10 key	Comment
ID+LT	(none)	1	0	Slow (long key-press required)
ID+N	1	2	1	
ID+M	2	M	2	
ID+C	(none)	(none)	3	Very slow

If the D10 table is not programmed, a system common SUBSTATION table will be used. This table is autoloaded to the old P32 default values, 00 and 38.

The use of ID+C is questionable in real life, but it's included in the software for completeness.

### 2.2.5. Direct Access from Special Keys

The stations have special keys, normally used during conversation. These keys/switches can dial numbers when activated in idle (system common programming). The feature must be used with care, as it may cause strange effects accidentally. Remember that some station hardware may be slow, giving M-key a moment when pressing the C-key, and so on.

#### 2.2.5.1. C-key

Autoloaded with the function *program off*. If this is not desirable, it can be programmed away, and *program off* can be made available as a regular directory number (80).

#### 2.2.5.2. M-key

No autoloaded number. May be used e.g. for the *program conference* function.

#### 2.2.5.3. Handset Off

No autoloaded number - simply busy-marks the station.. May be used e.g. to connect to a *dial pulse* (telephone) interface, or as a knock-down alarm.

This function must be used with care, as unused station lines are reported as handset off after a system reset.

The device *simple telephone* offers many different programmings for off hook dialing.

Option: Handset off does NOT busy-mark the station. Useful if a telephone handset is used for *call request*, where the caller waits with lifted handset.

### 2.2.6. External numbers

A special number format can be used to match all directory numbers not programmed explicitly as stations or functions. Intended use: dialing a number in another exchange, where the connection is handled by a LIM (not SLIM) board. See *external transfer* on page 34.

External numbers end with one or more Fs, e.g. 32F or 3FF. When a dialed number is analyzed, it will first try an exact match. If not found, it will replace the rightmost digits with Fs, and match again.

## 2.3. CALL FORWARDING

When a station number has been recognized, the exchange checks if the station has activated *call forwarding*. If so, the dialed number is replaced by the *transfer* number, and the call progresses as usual.

All stations may have a preset secretary, or they may forward their calls to any directory number. How to activate the different types of forwarding is described on page 32.

### 2.3.1. Secretary (Preset Transfer)

The call is established with an attention tone on both stations (unlike the MPC, which gives no indication whatsoever).

Secretary transfers are evaluated several times, i.e. if the initial secretary is transferred also, the call will go to that station's secretary and so on, until a station without secretary transfer has been found. The search will also stop if a transfer points to a station that has already been evaluated (two secretaries: each forwards to the other one when absent; there will be trouble when they both forward at the same time...)

A station with a secretary is called an *executive* station. When the executive station forwards its calls to the secretary, the secretary is the only station that can reach the executive directly. Option: all secretaries can reach all executives.

### 2.3.2. Follow Me and Call Forwarding

The call is established with an attention tone on both stations. The forwarded station will, if idle, receive an attention tone as a reminder.

The evaluation of Follow Me stops after one transfer, because the subscriber has indicated that he is at this station now.

The TouchLine Compact don't have the Follow Me variant the big TouchLine exchanges have, i.e. ring for a while at the B-subscriber, then jump to C. A similar effect can be obtained using the *unattended PRIVATE* option, where a station rings in PRIVATE, and then transfers either to its secretary or a pager (i.e. freely configurable) number.

## 2.4. CONVERSATION

The exchange can have 2 simultaneous conversations, using hardware on the SCB (speech channel) board.

### 2.4.1. Connect Tone

A conversation always starts with a 0.7 seconds, 500 Hz connect tone, and ends with a 0.2 seconds, 400 Hz disconnect tone.

Conversation setup without tone is possible (needed for *program conference*), but is not available in standard software - must be enabled at factory.

### 2.4.2. Microphone Live Indicator

The station LED is always ON when the microphone is open.

### 2.4.3. Notice Tone

Option:

A short bleep (200 ms of 400 Hz) every minute at both stations in a conversation, as a security feature against eavesdropping.

### 2.4.4. Speech Switching

The system can be programmed to start a conversation in either duplex or simplex, and in direction B-to-A or A-to-B.

#### 2.4.4.1. Duplex

A conversation normally starts in voice operated *duplex*, direction B to A. The direction will change away from the station that has the greatest increase in level (not just a stable high level).

#### 2.4.4.2. Simplex

If the M-key is pressed, the conversation goes into *simplex* mode, directed from the station that presses the M-key. If both subscribers presses the M-key at the same time, the B-subscriber has priority. When the A-subscriber presses the M-key, the amplification is increased 6 dB in the B-subscribers speaker, required for speaking into noisy rooms. The A-subscriber's M-key also operates the B-subscribers e-wire, this may be used to switch on a power amplifier, or to key a radio transmitter. Duplex mode can be entered again by a M-key press shorter than 0.5 seconds.

#### 2.4.4.3. Open Duplex

If both subscribers lifts their handsets, the conversation goes into *open duplex*, i.e. both can speak and listen at the same time (like a telephone). The conversation can be forced into simplex by using the M-keys, and a short M-key will return the conversation to open duplex.

#### 2.4.4.4. Handset off/on

When a handset is lifted, the amplification is reduced by 6dB (10dB by SCB hardware mod).

A handset can be replaced without disconnecting the conversation by pressing M-key simultaneously.

### 2.4.5. Extra Action Digits

This is a summary of functions activated by digit during conversation. Each function is described separately.

Digit	Function
0	Microphone mute
1	Transfer to preprogrammed number (pager)
2	Inquiry
3	Transfer to executive (during inquiry)
4	(unused)
5	(unused) Note: simplex conference replaced by <i>program</i> conference
6	Remote control
7	(unused) Note: <i>message waiting</i> included in <i>call me back</i>
8	Call (me) back
9	Transfer to secretary

Which function is activated by which key is programmable, and any function can be removed by assigning Microphone Mute to the key.

All digits can have an access level, e.g. allowing door opening to be performed by selected stations only.

#### 2.4.5.1. Microphone Mute

When a PAMEX (well, TouchLine these days...) station digit key is pressed, the microphone will be disconnected electrically. This is used as a function, and when programming away other functions, the key will inevitably execute a mute. Mute is indicated by LED off.

#### 2.4.5.2. Transfer to Preprogrammed Number (Pager)

When a conversation is established to an empty office, or during *busy* and *private*, digit 1 can be pressed, and the call is transferred to a preprogrammed number. It's autoloaded to 39, the recommended *wireless pager*. See description on page 23.

There can be a second preprogrammed transfer number, which must be assigned to another digit.

#### 2.4.5.3. Inquiry and Transfer

During a conversation between A and B, an *inquiry* conversation can be set up (say from B) by dialing digit 2, then C's number. A is parked with a busy tone, and the LED on (required by interfaces like TID and DPL where the LED gives handset off status). B can now switch between A and C by pressing 2 repeatedly (known as *Broker's function*)

The example above is typical for a secretary B handling calls to an executive C. B can *transfer* the call from A to C by pressing digit 3. Alternatively, C can transfer A's call by pressing digit 3. B is canceled automatically.

The requirements for B's transfer is programmable:

- only an executive's own secretary can transfer
- all secretaries can transfer to all executives (autoload value)
- all subscribers can transfer

C can always transfer the call to himself.

Inquiry calls to non-station directory numbers is possible to some extent, but may not be very useful. In most cases, digits during conversation are consumed by the function, i.e. the inquiry must be terminated by a C-key.

#### 2.4.5.4. Remote Control

If a station has some special hardware related to it (e.g. an electric door lock), it's possible for the conversation partner to activate this hardware by pressing digit 6 during conversation (independent of A or B subscriber). The function operates the other station's e-wire, switching off the station's LED simultaneously (and thereby the audio).

The remote control signal is active as long as the key is pressed, then the conversation is established again.

If the station in question is programmed as a *door station* station's e-wire will operate only when digit 6 is pressed. The speech channel is kept open, turned from the door to the station inside.

#### 2.4.5.5. Call (Me) Back

Digit 8 is used in several situations for similar purposes: to get in contact with a person not available at the moment. The call is placed in a system queue, and the dialing station is canceled.

During *busy*:

See description on page 18.

During *conversation* or *private*:

See description on page 15.

#### 2.4.5.6. Transfer to Secretary

When connected to an empty office, the call may be transferred to that station's *secretary* by dialing 9.

The secretary number may be a *voice paging* group call, automatically in the right area, or a *wireless pager*, automatically supplying the pager with the right pager number and display code.

## 2.5. CANCEL

### 2.5.1. C-key

A conversation (and all other use of a station) is canceled by pressing the C-key. The station is busy-marked as long as the C-key is kept pressed.

### 2.5.2. Handset on

Replacing a lifted handset cancels conversations, and works similar to the C-key in most situations.

(A handset may be replaced without cancel by pressing the M-key simultaneously.)

### 2.5.3. Time-out on Conversation

Option:

Conversations are disconnected automatically after a programmable time.

The timer is restarted every time one of the subscribers in the conversation presses or releases the M-key.

Time-out during inquiry: The current conversation is canceled, and the parked conversation is resumed. This conversation will eventually time out on it's own.

Note: the time should be longer than other system times like answer wait times etc., i.e. normally longer than one minute.

### 2.5.4. Call Me Back

The function is activated by pressing digit 8 (Call Back) during conversation (or *private*), starting blinks and bleeps at the called station. The call is stored in a queue, and the calls can be reestablished by dialing *station reset 70* on the blinking station.

The calls are stored in the queue until a successful conversation has been set up (independent of how the conversation was obtained).

There are two applications for this function:

- 8 from A-subscriber: telling an absent subscriber to call back later  
(advanced form of Message Waiting).
- 8 from B-subscriber: don't disturb, I'll call you back later

### 2.5.5. Priority

A conversation (and all other use of a station) may be canceled from a station with *priority*, or a data command from external equipment.

## 2.6. CALL RESTRICTIONS

There are many needs for restrictions in a loud-speaking intercom system, from an innocent "do not disturb" to complete blocking of calls and functions.

### 2.6.1. Private Mode

Most stations have a PRIVATE **switch**. Dialing to a PRIVATE station gives a ringing tone in both stations. The call must be accepted by the called person by pressing the M-key, lifting the handset or switching back to OPEN. The call is rejected by pressing the C-key, or letting it time out after 15 seconds.

Each station can be **programmed** for out-going or in-coming calls in PRIVATE (out-going is similar to MPC substations).

The *group restrictions* can be used to force a group of stations to reach another group of stations in PRIVATE only, see below.

Option:

Stations in group 0028 will receive no ringing tone. This can be used to obtain a lamp call, by connecting the station's e-wire (or a XO output) to a lamp, which will go on and off with the (silent) ringing pulses. Note that the calling subscriber receives a normal ringing tone.

Option:

When the PRIVATE ringing times out, it's possible to simulate an extra action digit. Intended for guard stations, which will transfer to pager or secretary if unattended. Limited to stations in group 0031. This works much like a delayed Follow Me.

### 2.6.2. Access Level

Each function have an access level between 0 and 3. Correspondingly, each station have an access level. The station must have access level greater or equal to the level of the function to be allowed to execute it. Rejection is signaled by a failure tone.

### 2.6.3. Non-existing Access Codes

A D10 key can be programmed to dial a number that only a few stations must be able to reach. After the D10 programming, the access code can be erased from the tables, leaving the reference information, and only the D10 can reach it. This feature is possible due to storage of table indexes rather than access codes for each D10 key.

### 2.6.4. System Programming Mode

Most programming functions are protected by switches located on the CPB board in the exchange cabinet, protected by the inconvenience of getting physical access to the exchange. The most common of these may be executed from an optional *system programming station*.

### 2.6.5. Group Restrictions

When group restrictions are activated, dialing a *station* number can give the following results:

- normal conversation (depending on B's PRIVATE switch)
- PRIVATE ringing (independent of B's PRIVATE switch)
- rejection with failure tone

The evaluation is performed early in the call setup, on the dialed number itself. Call forwarding from an inaccessible number to an accessible is ignored, as the restriction indicates that the dialing person (station) is not supposed to reach the dialed station (person).

The group restriction uses a from-to matrix to specify access restrictions between 8 groups of stations.

Example:

From	To	OPEN access								PRIVATE access							
		0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
0	Director	x	x	x	x	x	x	x									
1	Manager A	x	x	x	x	x											
2	Manager B	x	x	x	x		x										
3	Manager C	x	x	x	x			x									
4	Workers A		x			x											
5	Workers B			x			x										
6	Workers C				x			x									
7																	

The example shows a "workshop", where

- the director can talk to everybody.
- the managers can reach their own group, other managers and the director
- each group of workers are restricted to themselves plus their manager

The simplest programming is obtained by dividing the stations into max. 8 groups. The chart then defines clearly the access possibilities. If a station is included in more than one group, very complex access rules can be created.

#### Dynamic activation:

Group restrictions are normally active always. Optionally, up to 4 groups can be controlled by remote control inputs. This can be used with *call transfer* to restrict a call handling station's access to the times where the station receives calls from this group. See *transferable call* on page 34.

#### Direct Transfer:

The function *direct transfer* can be used to bypass the group restrictions, as this is a *function* number pointing to a station.

## 2.7. BUSY

When dialing to physical resources, they may be occupied with a conversation or a function. The dialing station will then hear a busy tone.

The system has a queue with 48 positions, storing the different types of waiting calls (including Call Me Back)

### 2.7.1. Camp On Busy

A station can wait with busy tone, in case the dialed station becomes free. The system maintains a queue of waiting stations, which will be connected one by one as soon as the dialed station becomes free (unless someone is waiting for *Call Back*). A station can wait max. 30 seconds, then it disconnects automatically.

All stations can camp on busy, waiting for one resource at a time.

Option:

When the busy tone times out, it's possible to simulate an extra action digit.

Intended for guard stations, which will transfer to pager or secretary if unattended.

Limited to stations in group 0031

### 2.7.2. Call Back

A station in *Camp On Busy* can press digit 8, which puts the station into a queue, and disconnects the station. The user is free to use the station while waiting.

The system will try to establish the conversation as soon as both stations becomes free, and a speech channel is free. At that time, the caller receives a ringing tone, which must be accepted by pressing the M-key (or lifting the handset), and then the conversation is established. The system don't check for free answer codes, possibly causing the accepted ringing to cause a busy tone (the problem occurs only with shared answer codes).

The ringing tone is twice as fast as normal ringing tone. If the accepted call leads to a ringing tone (*private* station or *call pickup*), there must be a recognizable difference to indicate that the M-key was recognized, and the call is in progress.

The call is deleted from the queue as soon as the conversation is established successfully. (The old P32, and the MPC cancels the call back as soon as both stations are free. If the called station starts dialing while the calling station receives the ringing tone, accepting the call gives a busy tone, the caller presses the C-key, and the call back is lost.)

The ringing tone must be accepted within 30 seconds, else the station disconnects and the call back is deleted from the queue. Also, if the ringing is rejected by pressing the C-key, the call is deleted from the queue.

If both parties don't become available within 5 minutes, the call is deleted from the queue.

### 2.7.3. Busy Override

#### 2.7.3.1. Preference

When dialing to a station that is either *busy* or *private*, a station with preference can press the M-key. An attention tone is heard, and the preference subscriber may give a message to the dialed station while pressing the M-key. (Corresponds to MPC preference II).

#### Against Busy:

Preference is possible only if the dialed station is in a regular *conversation*, as the message must be given over an existing speech channel, and the feature is implemented as a variant of inquiry (the B-subscriber can answer by pressing the M-key, and digits during conversation can be used). The other station will be parked with a busy tone. When the M-key is released, the interrupted conversation is re-established, and the dialing station receives the busy tone again.

#### Against Private:

Preference is always possible. When the M-key is released, the stations receives ringing tones again.

#### 2.7.3.2. Priority

A station with priority can disconnect a busy station or function by pressing the M-key. The station that is canceled will hear a failure tone. *Priority* is not possible against an existing priority conversation.

Note: Priority against stations with lifted handset does not work - the conversation is canceled, but the caller stays in CampOnBusy. It is possible, though, by setting the exchange in a mode where handset off doesn't busy-mark the station.

*Alarms* and *time signaling* has priority over station priority, thus canceling *voice paging* from stations. See page 25 for details. If the priority group call finds no free speech channel, the speech channel with least applied priority is taken, or if equal priority, the next channel, which means the oldest one here. Applied priority means that a station must actually have used it's priority to take the channel (group calls applies their internal priority immediately).

#### 2.7.3.3. Levels

Level	Action	Function
0	-	No preference
1	M, talk	A has preference to B if secretary <--> executive relationship (Did not work in version 30.0)
2	M, talk	A has preference to all stations
3	M	Priority



## 3. PHYSICAL DEVICES

---

### 3.1. STATIONS

The exchange can by programming be told which type of station is connected to each line, and it's intended use.

Note that the so-called **substations**, i.e. stations with simple electronics and only one or two keys, are detected automatically, and need not be programmed as a station type. The numbers dialed by the substation keys are programmed as D10 keys 1 and 2.

#### 3.1.1. Normal Station

Autoload value for all stations. Normal functions, and normal remote control (e-wire) operation.

Normal e-wire operation means that a B-subscriber's e-wire is operated in the following conversation situations:

- during tones (connect, disconnect, attention, ringing)
- A-sub pressing the M-key
- A-sub pressing digit 6 (*remote control*)

The e-wire is operated on own station:

- during Call Back ringing

#### 3.1.2. Power Amplifier Station

Functions as normal station, and the e-wire is in addition operated:

- during *group calls* and (option) *audio programs*.

The station can have an optional *answer code*, in cases where the station is used to page people. If not answered within 60 seconds, the call is disconnected.

Option: Answer code is active only during ringing. This works much like *Call Pickup*.

The answer code may also be used for the "rest corner" feature, where incoming calls to the normal work place can be transferred to the resting area (picked up) by dialing an answer code (should use unique answer codes, as shared answer codes causes mutual busy-marking of the stations).

#### 3.1.3. Door Station

The door station works as a normal station, but there are changes for *door bell* and *door opening* features. The station is normally a substation with one or two keys.

The station's e-wire is operated **only** when the conversation partner presses digit 6, independent of A- or B-subscriber. The speech channel is kept open, turned from the door to the station inside.

When dialing from a door station, the dialed function becomes active when the last digit is pressed. This is required because people assumes a bell that works as long as the button is down, and that is contrary to the normal intercom operation where action starts when the digit is released.

When the station dials a *door bell* group call (ding dong beep..beep), the number of beeps is taken from this station's programming, thus easily identifying the calling door among many (max. 8) possible doors. Pressing the call key again will repeat the door bell signal.

**3.1.4. Simple Telephone**

Primarily intended for the Telephone Line Board TLB, but can be used for regular stations also. It works as a regular station, except for a more advanced control of handset off/on. *Handset off* can dial a unique number for each station, e.g. different call request numbers. *Handset on* can also dial a number, e.g. cancel call request.

**3.1.5. Recording Device**

Intended for station lines going to external equipment like Line Interface with Modem (LIM/SLIM). Standard behavior, except no handling of digits during conversation, which are handled by the external system.

For incoming calls, digits during conversation will be handled. This can be used e.g. with a PNCI to let a switchboard station transfer calls.

## 3.2. DEVICES

### 3.2.1. Dial Pulse Subscriber (PNCI and Pager Interface)

Any subscriber board line can be a dial pulse interface, using the e-wire as pulse output. The exchange can have any number of dial pulse interfaces, but as the use requires a speech channel, only 2 can be active simultaneously.

The interface consists of a regular SLB subscriber position, connected either to the WPB board (hard-wired to number 39), or to an external board. External boards can be PNCI (full telephone), DPL (dial pulse pager), or DPL/DPDT (DTMF pager).

The on/off hook and dial pulse signaling controls the subscriber's e-wire (high speed pulsing is available for DTMF interfaces). Operation of the M-key may control a programmable output to key a radio transmitter (XO3 autoloading to follow no. 39).

#### 3.2.1.1. Dialing

The interface is a standard telephone dial pulse interface (use on telephone lines depends on approval in each country). When conversation is established, it will do an off-hook, and when canceled, it will go on-hook for 2 seconds. Digits during conversation will be buffered, and pulsed out in correct speed.

Option: The station stays in dialing mode (LED off/microphone off) after the connection tone, and goes into conversation mode (LED on/microphone on) when dialing is finished (5 sec. digit timeout). This is often required with old station types to assert reliable dialling without very long keypresses.

#### 3.2.1.2. Handset Mode

The interface will do handset off, allowing open duplex if the intercom station's handset is lifted (i.e. normal telephone feeling).

#### 3.2.1.3. Transfers

The pager function is aware if the connection was made via a transfer (digit 1 during conversation, or *call forwarding*). If so, the original B-number is pulsed out as the pager number, and the A-number is pulsed out as optional display info.

#### 3.2.1.4. Answer (Meet Me)

When used for wireless paging, the function may have an answer code. If the answer code is dialed on any station, the paging and answering stations are connected, and the dial pulse subscriber is canceled.

If the paging is not answered within 60 seconds, the call is disconnected.

Different dial pulse subscribers may have same or different answer code. See page 28 for details on *answer codes*.

#### 3.2.1.5. Incoming calls

The Dial Pulse Subscriber may be used for incoming calls. The connected interface board must give a substation (ID) pulse (possibly from a ringing tone detector), or use normal PAMEX tone signaling. Incoming calls can be set up in PRIVATE always (option). Digits dialed on the called station is handled as regular *extra action digits*, e.g. for switchboard inquiry and transfer.

If *voice paging* is activated (directly or via a transfer), the system simulates a permanent M-key from the dial pulse subscriber.

### 3.2.2. Tie Line (FLP)

This function is removed - exists in 30.x only!



# 4. FUNCTIONS

---

## 4.1. GROUP CALLS

### 4.1.1. General

Group Calls uses special hardware on the Subscriber Line Boards to add an audio signal on top of the normal use of the station. As the name indicates, many stations receive the same signal simultaneously. Note that the *audio program* feature uses the same hardware, and is thus removed temporarily during a group call. A station receiving a group call can remove it immediately by pressing the C-key.

#### 4.1.1.1. Programmable Groups

Group membership is freely programmable. In addition, DIP-switches located on the SLB board may exclude a station from all group calls.

#### 4.1.1.2. Busy Override

The different group call types have an internal (programmable) priority: Alarm (most important), time signaling, door bell, voice paging (least important).

Selected voice paging groups can have a priority over other voice paging groups, e.g. allowing a person with access to *all call* to cancel a local group call.

Priority is applied both between the group calls, and to get resources like speech channels from conversations.

#### 4.1.1.3. Programmable Mutual Exclusion

Audio feedback may occur if the station activating Group Call is near a station receiving the same call. This is solved by excluding neighbors according to programming: there are 4 special groups, each programmed with a small number of stations that will not receive group calls initiated from one of the other stations in the same group. It's also possible to use DIP-switches located on each subscriber line board, which excludes physical neighbor stations within groups of 4 stations.

Option: exclude physical neighbors in groups with programmable size, normally 2 or 3. This is useful e.g. when using intercom in 2-bed hospital rooms.

#### 4.1.1.4. Programmable Behavior

The descriptions below gives the standard behavior of the different group call types. It's possible to modify number of gongs, beeps etc., and to mix the different behaviors to some extent (e.g. alarm from station with voice message).

#### 4.1.1.5. Internal/external Signal Source

All group call types have tone signals generated by the exchange. It's possible to use external signals instead, depending on programming or DIP-switch settings.

#### 4.1.1.6. Use of Speech Channels

The group call requires a speech channel if:

- internal tones (gong, beeps) are used
- voice message is used
- the function has an answer possibility

I.e.: Time signals and alarms using external tones don't disturb ongoing conversations.

#### 4.1.2. Voice Paging

The function is activated by dialing e.g.

09 + M-key
------------

Voice paging is a gong followed by a message.

It's used to give messages to many persons, or to search for a person by saying a name. In the last case, it's possible to answer the call from any station, by dialing an *answer code*. The answer function cancels the group call, and establishes a regular conversation. See page 28.

Voice paging progresses this way:

- dial the function access code
  - A gong (ding-dong) is heard in all stations in the group
- press the M-key, and give the voice message
  - The message is heard in all stations in the group
- release the M-key
- the user may now wait for an answer, possibly repeating the voice message  
(an *answer* will cancel the group call here) .  
Time-out: 30 sec., restarted by pressing the M-key.
- cancel with the C-key

The exchange is autoloaded with all stations in group 0, which is called *All Call*.

Voice paging activated from a *Dial Pulse Subscriber* gives automatic M-key.

#### 4.1.3. Door Bell

The function is activated by (a substation) dialing e.g.

B10
-----

A door bell is a double gong followed by a number of beeps.

Each door station activating a door bell group call can be assigned a "door number", which is used as the beep count. If the call button is pressed again, the signal will be repeated. Any station can talk to the door by dialing an *answer code*.

#### 4.1.4. Time Signal

The function is activated by (remote control) dialing e.g.

B16
-----

A time signal is an endless sequence of gongs.

Time signals can be started by dialing a function access code, or by activating a hardware input in the exchange. It's active as long as the station don't cancel, or the hardware signal is active. It has priority, i.e. it will cancel ongoing use of the group call hardware and/or required speech channels.

Variant: the tone signal may be "ding"s only, or "dong"s only.

**4.1.5. Priority Voice Paging**

The function is activated by dialing

ABBA
------

A priority voice paging is an important voice paging, with priority over all functions except alarms.

**4.1.6. Alarm Call**

The function is activated by (remote control) dialing

EBBE
------

An alarm call is an endless sequence of beeps.

Alarm goes to all stations, independent of any exclusion programming or DIP-switch settings. Stations can be used for regular conversations. The alarm signal is removed temporarily during conversations, and restored afterwards.

It's activated as described for time signals, but have priority over everything. It will if necessary reset the exchange to free all resources (if activated from remote control, and no speech channel is available).

## 4.2. ANSWER (MEET ME)

The function is activated by dialing e.g.

00
----

The answer codes are used to establish conversation with a station that has activated a paging function:

Code	Answers function	See
00	Voice paging (group call)	page 25
01	(free)	
02	(free)	
03	(free)	
04	Call pickup	page 37
05	Power call paging	page 21
06	Wireless paging	page 23
07	(free)	

The exchange has max. 8 different answer codes, assigned to each of the functions by programming.

It's possible to have shared answer codes, with mutual busy-marking of the functions with equal answer code. When using shared codes, you must consider the ease of use versus blocking (from a traffic estimate).

The different paging functions have separately programmable answer time-outs, re-triggered when the M-key is pressed or released. If an answer code is dialed when there is nobody waiting, the function terminates immediately with a failure tone.

## 4.3. AUDIO PROGRAMS

### 4.3.1. General

The exchange has 2 audio programs. Audio programs are connected to a station when the station is not in use. The program is removed as soon as a digit key is pressed, and returns when the activated function disconnects. The program is removed during group calls, i.e. during the tone signals, and during the message.

#### 4.3.1.1. Handset

The program is not disturbed by a lifted handset. The program is on until dialing starts, and returns when the activated function disconnects, even if the handset is still lifted.

#### 4.3.1.2. Cancel Tones

All program access codes goes through the general station cancel function, giving a cancel tone. This means that pressing e.g. digit 4 gives a cancel tone, then the program sound, and pressing the C-key also gives a cancel tone before the program is removed.

#### 4.3.1.3. Permanent Storage

The selected program is normally stored in volatile memory, i.e. it will go away if the exchange is reset. All program related access codes can be programmed to store the selected program number in EEPROM. The autoloader includes this feature only for *remote setup* of program, which may be used even on your own station if permanent storage is desired.

#### 4.3.2. Program Selection

The function is activated by dialing e.g.

4

The autoloading program numbers are 4 and 5. (81 or 82 MPC autoloading).

If programs are not used, it's recommended to turn the program volume on the SCB board down, as accidental selection of programs may cause noise.

#### 4.3.3. Program Off

The function is activated by dialing

C-key or A80

In the autoloading, the C-key is programmed to dial this function, thus disconnecting the program if it's pressed when the station is idle.  
(80 MPC autoloading)

#### 4.3.4. Program Step

The function is activated by (a substation) dialing

A83

The function is normally used from a substation, with one call button and one program button. It steps one program at a time, through program OFF,1,2.  
(83 MPC autoloading)

#### 4.3.5. Remote Program Setup

The function is activated by dialing

75 + program\_no + station/group\_no

The function is accompanied by tones like this:

- starts with an attention tone
- then dialing tone until a complete program\_no has been dialed
- then a 0.5 seconds pause
- then dialing tone until a complete access code has been dialed
- then success tone, or failure tone if the access codes was illegal

Note that the operation can be performed both on a single station, and a group of stations. The **program\_no** is either dialed as the program selection access code, or the program's physical number 000p. The **group\_no** is either dialed as a group call access code, or a group physical number 00gg.

The program is connected immediately, except if the station is busy. A program selected remotely is stored in EEPROM, and will be restored after a reset.

#### 4.4. PROGRAM CONFERENCE

A program conference uses a number of functions to obtain a goal:

- many stations can listen to a conference by selecting an *audio program*
- one (or more) stations can speak by pressing the *M-key*

The M-key dials a *group hunt* variant, which adds the current program number to it's programmed group (search list) number. The search list contains station numbers, i.e. subscriber board lines that are fed to the program, possibly via some external audio conference equipment with multiple inputs. A conversation is set up to one of these numbers, without connect tone, in simplex A-to-B. The conversation is canceled when the M-key is released, without cancel tone.

If the station pressing the M-key has no program, a failure tone is given.

## 4.5. CALL FORWARDING

### 4.5.1. General

The application of call forwarding (transfers) is described under conversation setup, see page 11.

#### 4.5.1.1. Blinks and Bleeps

Activated forwardings are indicated with blinks and bleeps when the station is idle:

- the LED will blink once every second
- the speaker will give a short bleep once every minute

The bleep can be switched off by setting the station in PRIVATE.

#### 4.5.1.2. Storage

Each station has **one** transfer destination stored in EEPROM. Each time a transfer is activated, it replaces the current value of the transfer destination.

This means that e.g. if a secretary does *follow me* with the executive station, the system automatically handles this as a secretary transfer, as the destination is equal to the executive's secretary.

#### 4.5.1.3. Function Tones

All the functions described below are accompanied by tones.

The functions without parameters simply terminates with an success tone.

The functions with parameters proceeds like this:

- starts with an attention tone
- then dialing tone until a complete access code has been dialed
- then success tone, or failure tone if the access code was illegal in the situation

#### 4.5.2. Preset Forwarding (Secretary)

The function is activated at your **own** station by dialing

71
----

Each station can have a preset transfer (secretary), which can be a *station* or a *function*. The most usual functions used are *voice paging* or *wireless paging*.

The preset number is programmed with the code 781, see the Programming Reference.

#### 4.5.3. Follow Me

The function is activated on the **destination** station by dialing

72 + own_number
-----------------

The function is activated only if own\_number is a station number.

#### 4.5.4. Call Forwarding

The function is activated on your **own** station by dialing

74 + destination
------------------

The destination can be a station or a function. The function is activated only if the access code exists.

#### 4.5.5. Cancel Forwarding (Station Reset)

The function is activated on your **own** station by dialing

70
----

The function will clear the transfer destination in EEPROM.

In addition, calls stored by the *call me back* function may be activated; see description on page 15. The blinks and bleeps will be active until all calls has been received by dialing 70.

#### 4.5.6. Remote Cancel Forwarding

The function is activated from **any** station by dialing

73 + own_number
-----------------

The function will clear the transfer destination in EEPROM.

Note that this function is not identical to the MPC, where the *follow me* destination is different from the *secretary* destination.

## 4.6. CALL NUMBER TRANSLATIONS

### 4.6.1. Direct Transfer

The function simply replaces the already dialed digits by another sequence of digits, and then analyses the dialed number once more. If the result is not a complete access code, the subscriber must continue dialing.

Applications for Direct Transfer:

- several numbers for one station
- group restriction work-around: the direct transfer *function* can point to a *station* that is not directly accessible.
- code lock: more than 4 digits in secret code

A direct transfer to a station will ignore possible *call forwarding* set for that station. As an option, the call may handle forwarding normally.

### 4.6.2. Group Hunt

The function finds a free resource among many possible, where the user is not concerned which one he gets. The group hunt works with a list of access codes, programmed during commissioning. The list may be searched always from the start, or rotating.

Applications for Group Hunt:

- find a free station (person) to do a task
- find a free service, e.g. a *tie line* or *dial pulse* interface
- sequence functions, e.g. if a guard station is busy, do *call request*.

The system has max. 8 group hunts (programmable lists). The search will pass *busy* stations (or stations in PRIVATE). *Answer* codes are passed if not waited for by a paging function. Other functions are considered free always.

Note that a *forwarded* station is always free! Forwarding takes effect even if the station is PRIVATE.

Option: calls set up via group hunt gives an attention tone.

### 4.6.3. Transferable Call

A variant of *group hunt*, where a *remote control input* selects the first or second entry of a group as call destination. Purpose: Switching call handling between two guards, e.g. from a local to a central guard during night time.

### 4.6.4. External Transfer

A variant of *direct transfer*, i.e. a function number pointing to a physical number. Intended for LIM (not SLIM) communication: When a user dials an *external directory number*, he is connected to the LIM board (possibly after CampOnBusy). After successful connection, a data message is sent to the LIM telling which external function is desired, and the directory number dialed by the user.

Comment:

#### **4.7. DIGIT DATA TRANSMISSION**

Function used when communicating with external systems (e.g. SLIMs) via data. This function can switch on a tone on the connected station, and may have a time-out. Digits dialed on the station are sent to the external system on data - no internal actions take place.

## 4.8. SYSTEM MAINTENANCE

Most system programming codes are restricted, and as such described in the Programming Reference.

### 4.8.1. Program Own D10

An user can **program** his own D10 by dialing

784 + directory\_no + D10\_key

An user can **delete** his own D10 programming by dialing

784 + M + D10\_key

The system checks that the directory number exists, else a failure tone is given.

The functions has tones like this:

- starts with an attention tone
- then dialing tone until a complete directory\_no has been dialed
- then a 0.5 second pause
- then a dialing tone until the D10 key has been pressed
- then success tone, or failure tone if the directory\_no was illegal

### 4.8.2. Indicate Own number

The function is activated by dialing

788

It will make a number of beeps in the speaker, corresponding to the station's directory number. Zeroes are indicated as 10 beeps.

Example: Dial 788 on station 24, listen to the tones:

- pause
- two beeps
- pause
- four beeps

## 4.9. REMOTE CONTROL

### 4.9.1. General on I/O

All digital inputs and outputs are programmable, both for which station/function they correspond to, and the behavior during different situations.

I/O can be:

Board	Signal name	Max.
SLB	e-wires	32
CPB	X/XO wires	12

**Outputs** work only when specified, i.e. there is no need for external logic to determine when the e-wire is valid. The XO signals can be assigned to any directory number (station or function), and can either execute all control operations from a function, or a selected operation only. Station e-wires are controlled by the station, unless given to another station or function.

**Inputs** can be used to activate *alarm* and *time signaling*.

### 4.9.2. Call Pickup

This function activates a remote output for 30 seconds. The output is pulsed, suitable for a lamp or a buzzer. The activating station hears a ringing tone while waiting.

Anyone can establish a conversation with the station activating the call pickup by dialing an *answer code* 04.

There can be any number of Call Pickup functions, only limited by the use of answer codes (max. 7 simultaneously with different answers, or max. 32 with common answer and mutual busy-marking).

Note that a function similar to call pickup can be obtained by *silent private* ringing. See page 16.

## 4.10. LINE MONITORING

The exchange can be programmed to check station lines for errors. Both cable opens and shorts are detected. Line monitoring only checks the lines when the station is not busy. Note that the PAMEX station current signaling may be mistaken as line errors!

### 4.10.1. Line checks

#### 4.10.1.1. ab-wires

Monitors line current over a period of time (typically 20 seconds), reporting all stable states different from *handset on* as error.

*Handset off* looks like a cable open, *C-key* like a short. If e.g. the exchange is used for call request by lifting telephone handset, the monitoring time must be made correspondingly long.

#### 4.10.1.2. cd-wires

Monitors the line current by switching on the station microphone/LED for a short moment, with a programmable repetition frequency (typically once per hour). This operation is required to separate OPEN (vs. PRIVATE) from open cable.

### 4.10.2. Reports

Error reports are sent on data, with format depending on the type of display used.

#### 4.10.2.1. (S)LIM format

The LIM network has low signaling capacity, and line errors should not block conversation traffic. This format reports one error at a time (with a few repetitions) when the line becomes bad, and when it becomes OK again. The exchange may be inquired about line status if a central system needs to find current status.

#### 4.10.2.2. MPC format

All line errors in the exchange are reported periodically. No “line OK” message - this has to be assumed when no more error reports appear.

#### 4.10.2.3. Remote control output

A remote control output can be assigned to the error state. Whenever there is an error in the exchange, the output becomes active.

## 5. SERIAL DATA CHANNEL

---

The exchange has a serial data port, transmitting and receiving a subset of the MPC port B data protocol.

### 5.1. DATA RELATED FUNCTIONS

Some functions does nothing (or very little) with the station that activates them, their only purpose is to send data to external equipment like intelligent stations (German MLH, American CRM).

These functions are available as HEX access codes as indicated below. If necessary, regular programmable access codes can be assigned to these functions also.

The functions are accompanied by attention, dial, success and failure tones as described for *call forwarding* on page 32.

Note: to dial "all stations", FFFF, just press the M-key:

Exx + M_key
-------------

#### 5.1.1. E11 Lamp test

The function is activated by dialing

E11 + station_no
------------------

Transmits a lamp test data command, causing one (or all) intelligent stations to perform a lamp test.

#### 5.1.2. E12 Reset

The function is activated by dialing

E12 + station_no
------------------

Transmits a reset data command, causing reset in one (or all) intelligent stations. Some stations uses this code to cancel lamp test.

When the exchange does a reset, this data message is sent automatically, with station FFFF as parameter.

#### 5.1.3. E14 Call Request

The function is activated by dialing e.g.

A60
-----

When a call request number is dialed, the calling station will receive a success tone, and then be disconnected.

The call request state may be indicated by either *audio program* or *blinks and bleeps*. (Option: all call requests in the exchange has blink & bleep - allows both program and blink at the same time). In addition, a *remote control output* may be activated. The call request indication is canceled by a conversation from a station in group 0029 (or all stations).

The exchange transmits a data code, used by intelligent stations to put this subscriber in a call queue.

#### 5.1.4. E15 Intelligent station identification

The function is activated by dialing

786 + many\_digits + C-key

Intelligent stations have traditionally (LWT) been built as a mechanical unit containing a regular intercom station, and a microprocessor system. This means that the station can be used even if the microprocessor fails. The Microprocessor can simulate station actions, dialing digits and M/C-keys.

Local programming of the unit depends on digit data returned from the exchange.

To be able to recognize it's own data, the microprocessor must be able to identify it's own station's number.

Station identification is performed this way:

- the user enters programming mode, usually by turning a programming key
- the microprocessor dials E15
  - the station is busy-marked
  - a success tone is heard
  - the exchange transmits an identification data message
  - the exchange blinks the station LED (200-300 ms on)
- the microprocessor tests for the data message and the blink, when both have occurred, the directory number from the identification message is stored.
- digits dialed afterwards are returned from the exchange as serial data, interpretation depends on the intelligent station type
- turning the programming key off (or pressing the C-key) cancels the function.

#### 5.1.5. E17 Autoload from Station

The function is activated by dialing

E17 + number series

Number series is in the range 0 to 9, see the programming guide.

The function is most useful in the demo exchange, where the CPB2 DIP switches for number series selection is difficult to reach.

#### 5.1.6. E43 Dump Tables on Serial Port

The function is activated by dialing

E43 + memory area

The value "memory area" is 1 for the EEPROM tables. Data is dumped in INTEL HEX format. Interpretation of the data requires special documentation.

## 5.2. TRANSMITTED DATA

The transmitted data is compatible with the MPC port B data output. See the MPC data format documentation.

Note that the ref-info words are slightly different, and possible use must be verified in each case.

The following codes are supported (MLH, CRM, ++):

- 0200 Busy-marking
- 0201 Free-marking
- 0502 Call to busy station
- 0503 Call to private station
- 0504 Call to station
- 0206 Disconnect
- 0507 Call to function
  
- 020C Handset off
- 020D Handset on
- 020E M-key
- 020F C-key
  
- 0213 Reset
- 021B Lamp test
- 0422 Memory value
- 0327 Program changed
  
- 042C Call transferred (Secretary/FollowMe)
  
- 0230 Transfer off
- 0331 Secretary transfer off
- 0332 Follow Me transfer off
- 0333 Secretary transfer on
- 0334 Follow Me transfer on
  
- 0337 D10 (Substation) key pressed
  
- 048A External Connect
- 048B External Call Request
  
- 0492 Line error status
  
- 02AN Digit during conversation
  
- 03B5 Unknown B-subscriber
  
- 02CN Digit, handset off
- 02DN Digit, handset on
- 02EN Digit, M-key
- 02FN Digit, C-key

## 5.3. RECEIVED DATA

The exchange can receive a few basic data commands.

The reception requires the use of a handshake signal XO11, which the external computer must use as a ClearToSend indication.

The messages are MPC compatible:

<command\_letter><A-station><B-station><carriage-return>

Station numbers are 4 digits with leading Fs, e.g. number 25 = FF25.

The examples below includes spaces for readability only - they should **not** be included in computer generated commands!.

### 5.3.1. Commands

#### 5.3.1.1. Conversation Setup

Normal setup: H AAAA BBBB

Priority setup: J AAAA BBBB

#### 5.3.1.2. Cancel

Cancel station: Q AAAA

#### 5.3.1.3. Memory Read and Write

Memory read: M 0000 AAAA VVVV CCCC

Memory write: M 0001 AAAA VVVV CCCC

gives response 0422 AAAA VVVV CCCC

#### 5.3.1.4. Table Dump

Dump memory: r DDDa

a is memory area, use 1 for the EEPROM tables.

#### 5.3.1.5. Retransmit

Send received data on transmit port: X AAAA BBBB CCCC DDDD EEEE

Note: 2 messages are buffered

#### 5.3.1.6. Program setup

Control program at station: O 0004 AAAA PPPP

PPPP is program number: 0001 or 0002. Program off is 0031

#### 5.3.1.7. Tone setup

Tone followed by cancel: T AAAA TTTT

Tone without cancel: t AAAA TTTT

Handled when station connected to Digit Data (T and t), or conversation (T only).

#### 5.3.1.8. Remote control (door open)

Remote control on: [ AAAA

Remote control off: ] AAAA

#### 5.3.1.9. Line error status

Request line status: u AAAA

Response is 0492 ....

# 6. CHANGE LOG

---

Changes are relative to the previous release - chapter numbers also!

## 6.1. Version X30 (1991-08-13)

Test release - no changes logged.

## 6.2. Version X30 (1991-10-23)

Test release.

- 2.5.3 Time-out on conv.: .....restart requirements
- 2.6.1 Private mode: .....silent ringing tone for lamp call
- 2.7.2 Call back: .....different ringing tone
- 2.7.3.1 Preference: .....described busy and private separately
- 3.1.2 Power amp. station: .....timeout on answer
- 3.2.2.1 FLP dialing: .....B exchange autodial programmed as D10
- 4.1.1 Group call general: .....can be canceled with C-key
- 4.1.2 Priority voice paging: .....alarm from station
- 4.1.5 Alarm: .....can't be canceled with C-key
- 4.2 Answer: .....note on time-outs
- 4.6.1 Direct transfer: .....option for transfers
- 4.6.2 Group hunt: .....option for transfers
- 4.8.2 Call pickup: .....comment on silent private ringing
- 5.1.3 Call request: .....added description of indication and cancel
- 5.1.5 E38: deleted function
  - E17: new function: .....autoload from station
  - E43: new function: .....dump tables on data port
- 5.2 Transmitted data: .....0422 memory value
- 5.3 Received data: .....new commands: r and M

## 6.3. Version 30.0 (1991-11-06)

Official release

- 2.4.5 Extra action digits: .....D10 function deleted
- 2.4.5.3 Inquiry .....park with LED on
- 2.5.3 Time-out conversation .....during inquiry, note on length
- 3.2.1.5 Dial pulse sub .....new: incoming calls
- 4.1.2 Voice paging .....auto M-key from Dial pulse sub
- 4.1.4 Time signal .....tone variants: dings or donges
- 4.6.2 Group hunt .....handling of forwarding
- 4.8.1 General I/O .....changed "inputs" paragraph
- 4.8.3 Code Lock .....deleted function

## 6.4. Version 36.2 (1996-07-06)

Official release of all changes since 30.00

- 2.2.5.3 Handset off .....added *simple telephone*
- 2.2.5+ Dialing.....added *external number*
- 2.3.2 Follow Me .....added *unattended Private* paragraph
- 2.4.4 Speech switching.....startup direction moved here
- 2.4.4.3 Open duplex .....M-key operation added
- 2.4.4.3+ Handset.....paragraph added
- 2.5.4+ Cancel.....new paragraph *Priority*
- 2.6.1 Private Mode .....added *unattended option* paragraph
- 2.6.5 Group restriction.....dynamic activation
- 2.7.1 Camp On Busy .....added *unattended option* paragraph
- 2.7.3.2 Busy Override.....added *Handset Off mode*
- 2.7.3.3 Busy Override.....Preference 1: Error comment
- 3.1.2 Power Amp. station .....added answer option
- 3.1.3+ Stations.....added *Simple Telephone*
- 3.1.3+ Stations.....added *Recording device*
- 3.2.1 Dial pulse sub .....PNCI added, DTMF changed
- 3.2.1.1 Dialing .....LED off added, DTMF changed
- 3.2.1.5 Incoming.....*Extra digit action* added
- 3.2 Devices .....Device *Tie Line* removed
- 4.6.2+ Functions .....added *Transferable Call*
- 4.6.2+ Functions .....added *External transfer*
- 4.6.2+ Functions .....added *Digit data Transmission*
- 4.8+ Line Monitoring .....new chapter
- 5.1.3 Call Request .....added option: blinks *and* program
- 5.2 Transmitted data .....additions
- 5.3 Received data .....additions
- 6. Tie Line (FLP).....Chapter removed

# 7. INDEX

## A

Access code	
definition .....	7
non-existing .....	16
Access level	
description .....	16
extra action digit .....	13
Alarm call	
description .....	27
All call	
voice paging group 0 .....	26
Amplification	
increase with M-key .....	12
reduced when lifting handset .....	12
Answer	
active during ringing only .....	21
application	
dial pulse subscriber .....	23
door bell group call .....	26
power call paging .....	21
transfer call .....	21
voice paging .....	26
wireless paging .....	23
description .....	28
evaluation in group hunt .....	34
Audio program	
call request indication .....	39
description .....	29
hardware limitation .....	25
idle station .....	9
program conference .....	31
temporary removal .....	25
Auto dialing	
dial pulse subscriber .....	23
Autoload	
definition .....	7
from station .....	40

## B

Blinks and bleeps	
call forwarding .....	32
call me back .....	15
call request indication .....	39
idle station .....	9
Broker's function	
during inquiry .....	14
Busy	
description .....	18
during group hunt .....	34
extra action digit	
call back .....	14
transfer to pager .....	13
requirement	
C-key pressed .....	15
handset off .....	10

shared answer code .....	28
Busy override	
group calls .....	25
preference .....	19
priority .....	19

## C

Call back	
description .....	18
extra action digit .....	14
Call forwarding	
activation .....	33
call forwarding	
activation .....	33
application .....	11
cancel .....	33
during call setup .....	11
follow me	
activation .....	33
application .....	11
preset	
activation .....	33
application .....	11
transferable call .....	34
Call me back	
description .....	15
extra action digit .....	14
queue .....	18
Call me back	
accept calls .....	33
Call pickup	
description .....	37
power amplifier answer option .....	21
Call queuing	
call back .....	18
call me back .....	15
call pickup .....	37
call request .....	39
camp on busy .....	18
Call request	
automatic queuing .....	34
description .....	39
Call restriction	
description .....	16
group restrictions .....	17
Camp on busy	
description .....	18
Cancel conversation	
C-key .....	15
handset on .....	15
time-out .....	15
Cancel forwarding	
own station .....	33
Cancel forwarding	
remote	
activation .....	33

## INDEX

C-key		
application		
cancel conversation.....	15	
program off.....	30	
rejecting call back.....	18	
rejecting private call.....	16	
direct access key.....	10	
remove group call.....	25	
Code lock		
direct transfer function.....	34	
Conference		
program conference.....	31	
Confidential conversation		
handset off.....	12	
Conversation		
description.....	12	
no tones.....	12	
<b>D</b>		
D10		
application		
dialing.....	9	
non-existing access code.....	16	
program own.....	36	
D10 table		
private directory.....	9	
substation programming.....	10	
system common.....	9	
Dial pulse subscriber		
application		
direct access.....	10	
automatic M-key		
in voice paging.....	26	
description.....	23	
find free line.....	34	
Dialing		
dial pulse subscriber.....	23	
fail		
missing board.....	9	
restrictions.....	9	
numbers.....	9	
Digit during conversation.....	<i>see Extra action digits</i>	
Direct access		
C-key.....	10	
D10.....	9	
Handset off.....	10	
M-key.....	10	
special keys.....	10	
substation.....	10	
to own secretary.....	9	
Direct transfer		
application		
group restrictions.....	17	
description.....	34	
Direction		
speech switching.....	12	
Door		
bell		
description.....	26	
from door station.....	21	
opening		
at door station.....	21	
Door opening.....	<i>see Remote Control</i>	
Door station		
description.....	21	
DPL board		
application		
dial pulse subscriber.....	23	
DTMF signalling		
dial pulse subscriber.....	23	
Dump tables		
on serial port.....	40	
Duplex		
speech switching		
definition.....	12	
start-up direction.....	12	
<b>E</b>		
Eavesdropping		
notice tone.....	12	
EEPROM		
definition.....	7	
Enquiry.....	<i>see Inquiry</i>	
E-wire		
dial pulse output.....	23	
door station		
extra action digit.....	14	
during call back ringing.....	21	
normal station.....	21	
remote control		
extra digit action.....	14	
M-key.....	12	
Executive station		
definition.....	11	
in inquiry.....	14	
External directory number		
application.....	34	
External number		
description.....	10	
External signal		
group calls.....	25	
External transfer		
description.....	34	
Extra action digit		
access level.....	13	
definition.....	13	
remove.....	13	
when unattended busy.....	18	
when unattended private.....	16	
<b>F</b>		
Failure tone.....	<i>see Tone, failure</i>	
Feedback		
mutual exclusion.....	25	
Follow me		
activation.....	33	

application .....	11
unattended private option .....	16
Function	
access level .....	16

**G**

Group	
0028 - no private ringing .....	16
0031 - unattended busy transfer .....	18
0031 - unattended private transfer .....	16
Group call	
alarm .....	27
description .....	25
door bell .....	26
application .....	21
on idle station .....	9
priority voice paging .....	27
time signalling .....	26
voice paging .....	26
Group hunt	
application	
program conference .....	31
description .....	34
Group membership	
description .....	25
Group number	
access code .....	30
physical number .....	30
Group restrictions	
call restriction .....	17
private call .....	16
Guard	
group hunt application .....	34
time-out to transfer (busy) .....	18
time-out to transfer (private) .....	16
transferable call .....	34

**H**

Handset	
application	
accepting call back .....	18
accepting private call .....	16
confidential conversation .....	12
during audio program .....	29
during dialing .....	9
reduced amplification .....	12
replace	
no cancel .....	12
Handset off	
direct access action .....	10
no busy-marking .....	10
simple telephone .....	22
Handset on	
cancel conversation .....	15
without cancel .....	15
High speed pulsing	
dial pulse subscriber .....	23

**I**

Idle station	
description .....	9
Indicate own number	
description .....	36
Input	
activate time signalling .....	26
Inquiry	
extra action digit .....	14
Intelligent station identification	
description .....	40
Internal signal	
group calls .....	25

**K**

Knock-down alarm	
Handset Off .....	10

**L**

Lamp call	
silent private ringing .....	16
Lamp test	
description .....	39
LED	
indication	
forwarding .....	32
microphone mute .....	13
microphone live .....	12
off	
during remote control .....	14

**M**

Meet me .....	<i>see Answer</i>
Message waiting .....	<i>see Call Me Back</i>
Microphone live	
indicator .....	12
Microphone mute	
extra action digit .....	13
M-key	
application	
accepting call back .....	18
accepting private call .....	16
cancel program conference .....	31
keying a radio transmitter .....	23
preference .....	19
priority .....	19
program conference .....	31
remote control .....	12
voice paging message .....	26
voice switching .....	12
direct access key .....	10
increase amplification .....	12
short .....	12
simplex switching .....	12
simulated	
dial pulse subscriber .....	23

INDEX

MPC differences  
call back out of queue ..... 18  
forwarding tones ..... 11  
no simplex conference ..... 13  
one forwarding destination ..... 32  
parked sub  
LED on ..... 14  
preference  
parked sub get busy tone ..... 19  
priority  
cancel with failure tone ..... 19  
remote cancel forwarding ..... 33  
Mute microphone  
extra action digit ..... 13  
Mutual exclusion  
group calls ..... 25

---

**N**

---

Number series  
programmable ..... 9

---

**O**

---

One-step paging  
description ..... 23  
extra action digit  
transfer to pager ..... 13  
transfer to secretary ..... 14  
Open  
application  
accepting private call ..... 16  
station key ..... 16  
Open duplex  
speech switching ..... 12

---

**P**

---

Pager interface ..... *see Dial pulse subscriber*  
park  
conversation ..... 14  
Permanent  
audio program ..... 29  
Power amplifier station  
description ..... 21  
Preference  
busy override  
description ..... 19  
Preset forwarding  
activation ..... 33  
Priority  
busy override  
description ..... 19  
cancel conversation ..... 15  
group calls over conversations ..... 25  
within group calls ..... 25  
within voice paging groups ..... 25  
Priority voice paging  
description ..... 27

Private  
call restriction ..... 16  
extra action digit  
call back ..... 14  
call me back ..... 14  
transfer to pager ..... 13  
software function ..... 16  
station key ..... 16  
time-out to transfer ..... 11  
Private key  
application  
mute bleep indicator ..... 32  
pass in group hunt ..... 34  
Program  
off  
C-key ..... 10  
description ..... 30  
selection  
description ..... 30  
remote ..... 30  
step  
description ..... 30  
to group ..... 30  
Program conference  
description ..... 31  
M-key ..... 10  
Programming  
definition ..... 7  
own D10  
description ..... 36  
Programming mode  
call restriction ..... 16  
Programming station  
option ..... 16

---

**R**

---

Remote  
cancel forwarding ..... 33  
program select ..... 30  
Remote control  
activating restrictions ..... 17  
dial pulse interface ..... 23  
extra digit action ..... 14  
functions  
description ..... 37  
transferable call ..... 34  
Restrictions  
calling ..... 16

---

**S**

---

Secretary  
direct access own secretary ..... 9  
extra action digit  
transfer to secretary ..... 14  
station  
definition ..... 11  
in inquiry ..... 14  
transfer (call forwarding, preset) ..... 11

Serial data  
input summary ..... 42  
output summary ..... 41  
table dump ..... 40

Silent private ..... 16

Simplex  
speech switching  
definition ..... 12  
start-up direction ..... 12

Speech channel  
conversation ..... 12  
door opening ..... 14  
during priority ..... 19; 25  
group call ..... 25  
not required ..... 25

Speech switching  
description ..... 12

Station  
access level ..... 16  
at door ..... 21  
find free ..... 34  
number  
definition ..... 7  
several for one ..... 34  
open state ..... 16  
private state ..... 16  
type descriptions ..... 21  
with power amplifier ..... 21

Station reset  
application  
cancel forwarding ..... 33

Station reset  
activation ..... 33  
application  
call me back ..... 15

Substation  
application  
door bell station ..... 21; 26  
private call ..... 16  
program step ..... 30  
description ..... 21  
dialing ..... 10

Substation table  
system common ..... 10

Success tone ..... *see Tone, success*

**T**

Tie line  
find free line ..... 34

Time signal  
description ..... 26

Time-out  
answer in general ..... 28  
answer to call pickup ..... 37  
answer to power call ..... 21  
answer to voice paging ..... 26  
answer to wireless paging ..... 23  
call back  
in queue ..... 18

ringing ..... 18  
cancel conversation ..... 15  
dialing numbers ..... 9  
private ringing ..... 16  
to transfer (busy) ..... 18  
to transfer (private) ..... 16

Tone  
attention  
activate call forwarding ..... 32  
function start ..... 9  
group hunt ..... 34  
preference ..... 19  
use of call forwarding ..... 11

beep  
alarm ..... 27  
door bell ..... 21; 26  
indicate own number ..... 36

bleep  
call me back indicator ..... 33  
forwarding indicator ..... 32

busy  
calling ..... 18  
connect ..... 9  
conversation ..... 12  
none ..... 12  
connection to remote control ..... 21  
dialing ..... 9  
disconnect ..... 9

failure  
access level ..... 16  
answer code ..... 28  
call forwarding ..... 32  
definition ..... 7  
dialing ..... 9  
group restrictions ..... 17  
in function ..... 9  
M-key - no program conference ..... 31  
priority applied ..... 19

gong  
door bell ..... 26  
time signalling ..... 26  
voice paging ..... 26

none  
program conference ..... 31  
silent private ringing ..... 16

notice  
conversation ..... 12

ringing  
private station ..... 16

ringing  
call back ..... 18  
call pickup ..... 37  
group restriction ..... 17

success  
call forwarding ..... 32  
definition ..... 7  
in function ..... 9

Transfer  
auto-dialing to dial pulse subscriber ..... 23  
direct  
description ..... 34  
extra action digit

## INDEX

during inquiry .....	14
one-step paging .....	23
unattended busy .....	18
unattended private .....	16
using answer code .....	21
Transfer call .....	<i>see Call Forwarding</i>
Transfer to pager	
extra action digit .....	13
Transfer to secretary	
extra action digit .....	14
Transferable call	
description .....	34
Translations	
call numbers .....	34

## U

---

Unattended Private	
time-out to transfer .....	16

## V

---

Voice paging	
application	
secretary .....	33
description .....	26
one-step paging	
via transfer .....	14

## W

---

Wireless paging	
answer .....	23
application	
secretary .....	33
interface	
dial pulse subscriber .....	23
one-step paging	
activation .....	13
via transfer .....	14
WPB board	
application	
dial pulse subscriber .....	23

## X

---

XO11	
serial data handshake .....	42



*In the interest of product development, STENTOFON reserve the right to alter specifications or design without notice*

