DAX
Digital Door Entry System

PD-003 Issue 4

Contents

Introduction

The DAX Digital Door Entry Telephone System is designed to provide security, by means of Door Access Control, to all forms of communal housing including blocks of flats, apartments, sheltered housing and nursing homes. The System is particularly suited to medium and large sized buildings where a conventional Door Entrance Panel, with individual push-buttons, may be impractical due to its size. The Entrance Panel is designed for ease of use and with a very high level of Vandal Resistance.

The DAX system enables a Visitor to call an individual Resident from a Door Entrance Panel; for the Resident to converse with the caller using a Telephone Handset and, if required, to allow them access to the building by pushing a button to operate an electric door release. The Door Entrance Panel has a simple 16-button keypad for typing the flat number and a clear, large-character, liquid-crystal display (LCD) which provides user-friendly messages and instructions.

Access to the building by Residents, Housing Officers, or other Authorised Tradesmen can be achieved with the use of the Trades button. This can operate either with a 4-digit access code or, if required, in conjunction with a Time-Clock for unrestricted access during certain hours.

A Porter button enables a Visitor to call the Porter or Warden without requiring a knowledge of the designated flat number.

The DAX System operates on a 'telephone exchange' principle, as opposed to the more usual 'common wiring' approach; Each telephone is isolated by an individual relay circuit, fuse and cable. This ensures that conversations are totally private and that any damage sustained to a telephone or its associated cable will not effect the operation of the rest of the system.

Summary of System Features

- Connection of up to 256 flats.

- Operation from up to 4 Entrances.

- Vandal Resistant 'Laser' Entrance Panel.

- Large, backlit, 16-character LCD display providing user-friendly prompts.

- Alpha-numeric Flat Numbers of upto 4 characters.

- Four-digit Coded Access Facility.

- Trades and Porter facility.

- Isolated Telephone Connections for Privacy of Speech and low maintenance.

- Battery backup giving uninterrupted operation during power failure.

- Outputs for Fail-Safe and Fail-Secure lock release mechanisms.

- Egress facility/ Fireman's Override switch.

Programmable Features

All Parameters listed below are user-programmable and stored in a non-volatile memory.

- Lock Release duration.

- Speech connection time.

- Telephone call time.

- Access Code (4-digits).

- Trades button operation; 4 modes

- Porter Flat Number designation

- Door Open Indication; 2 operating modes and optional delay time

Operating Instructions

Keypad Operation

0-9   Press to Enter a flat number or the numeric part of an alpha-numeric flat number.

A-Z   Press to Enter a letter; press once to enter **A**; press again to step through the sequence **B,C ,D.....Z.** etc.

Z-A   Press to correct a letter previously entered with **A>Z**; press to step through the sequence **Z.....D,C,B,A.**

CALL   Press to buzz the telephone of the displayed flat number.

CANCEL   Press to clear the system, and make ready for entry of a Flat Number.

TRADES   Press to gain access during permitted time period (a 4-digit access code may be required).

PORTER   Press to call the Porter or Warden without entering the flat number.

Conversing with a resident and entering a building

Instructions are provided on the entrance panel.

1.   **Press "CANCEL"**,

    | FLAT NUM > | Will appear to prompt for a flat number.

2.   **Enter the flat number required**

     Use the keys **0-9** to enter a number; To enter a letter press the **A>Z** key until the desired letter appears; press **Z>A** to step backwards. An incorrect flat number can be cleared by pressing **CANCEL**.

     For example, to enter B12 press **A>Z   A>Z   1   2**

    | FLAT NUM >   B12 |

3.   **Press "CALL"** to buzz the resident's phone.

CALLING

will appear to indicate that the telephone is being buzzed.

followed by:

FLAT NUM >   NNNN

Indicates that a two-way conversation is possible as soon as the resident picks up the handset.

PLEASE WAIT

Indicates the resident's phone is engaged, wait a short time and then press **CALL** again.

UNAVAILABLE

Indicates that an incorrect flat number was entered, press **CANCEL** and start again.

4.   Press **CALL** again, if required, to draw the resident's attention.

5.   During speech the resident can press the **telephone lock button** at any time to operate the electric lock release and allow entry.

PLEASE ENTER

Appears for a few seconds during which time the caller may enter.

Calling the Porter/Warden

1.   Press **PORTER** to call the Porter/Warden's telephone:

PORTER

Indicates that two-way conversation is possible as soon as the Porter picks up the handset.

PLEASE WAIT

Indicates that the Porter's telephone is engaged, wait a short time and then press **PORTER** again.

UNAVAILABLE

Indicates that there is no Porter facility available.

2.   Press **PORTER** again, if required, to draw attention.

Tradesman/Coded Access Facility

1.   **Press "TRADES".**

| ACCESS DENIED | Indicates access is disabled at the time attempted. |

| PLEASE ENTER | Indicates that the tradesman may enter immediately without an access code. |

| ENTRY CODE> | Prompts the use for a 4 digit access code. |

2.   **Enter the required 4 digit access code**

| ENTRY CODE> **** | An ✳ will be displayed for each digit entered. Press **CANCEL** to clear a mistake: |

| INVALID ENTRY | Indicates that an incorrect code was entered, press **TRADES** to try again |

| PLEASE ENTER | Appears for a few seconds, indicating that the code has been accepted; the caller may enter during this time. |

For each of the two states (ON or OFF) set by a Time-Clock, the system may be programmed to allow any one of the following 1: no access, 2: immediate access, or 3: coded access.

Multi-entrance Operation

A DAX system may have up to four Entrance Panels. The operation from each of these is exactly as described above, however, only one Resident, within a bank of 64 flats, may be called at a time. If a call is made from one Entrance, the other Entrance(s) will display 'PLEASE WAIT' if an attempt is made to make a call from them.

On a system with more than one Control Cabinet (ie with more than 64 flats) simultaneous calls are possible, providing both Entrances are calling telephones within their local Control Cabinets; i.e. as soon as a call is made from an entrance of one Control Cabinet to a telephone of another, all other Entrances/Telephones within those two Control Cabinets will be engaged.

Additional Telephones

Telephones

Telephones

DAX Control cabinet

Up to 64 phones

To next DAX Control cabinet (optional)

Door Panel

Lock Fail Safe/ Secure

Fire Switch

Door Open Switch

Tone Output

Door Panel

Lock Fail Safe/ Secure

Fire Switch

Door Open Switch

Tone Output

Entrance 1

Entrance 2 (optional)
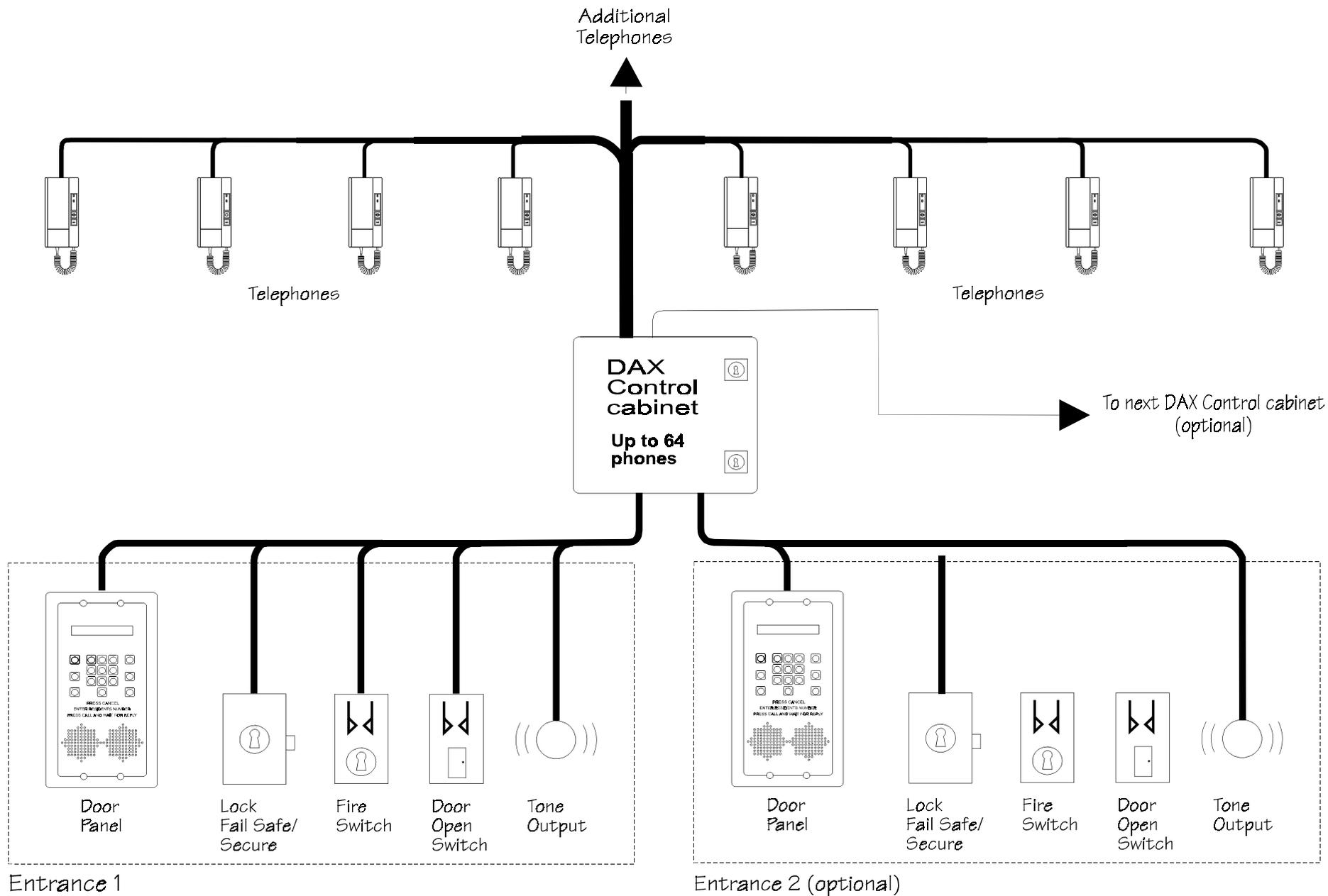
Diagram 1 System Components

System Components

A DAX Digital Door Entry System comprises the following components:

- **DPX Entrance Panels -** one per door; each including a **DM10 LCD Display Module** (Liquid Crystal Display), and a **Model 51 Speech Unit.**

- **DAX Control Cabinets** - each complete with a Power Supply (with optional battery standby), a Time-Clock, and all necessary control electronics to connect up to 2 entrances and 64 flats. Additional Control cabinets are needed for further flats and/or entrances.

- **Model 500X Telephones** (or various other models) - one required per flat

- **An Electric Lock Release** - various types

DPX Door Entrance Panel

The DPX Door Entrance panel is of a flush-mounting, vandal resistant design. The panel and surrounding bezel are laser cut from a single piece of 304 grade 12 swg stainless steel; this allows for a gap of only 0.2mm, rejecting tools that could be used to force the panel from its back-box. The bezel is welded to an integral back-box made from 16 swg stainless steel.

The layout of the DPX panel is illustrated in Diagram 2 overleaf, which shows the following features:-

- A large transparent window manufactured from LEXAN or an equivalent material which has an extremely high impact resistance.

- A keypad comprising of 16 stainless steel buttons. These are protected from impacts by a 2mm Aluminium stop-plate at the rear.

- A speech grill comprising of a fine stainless-steel mesh, placed behind a decorative pattern of closely-spaced 2.5mm holes.

- Clear Operating Instructions, engraved and in-filled in black.

LCD Display with backlighting

► PLEASE ENTER

Entry of letters A to Z

A-Z

Z-A

PORTER

To call a Porter or Warden

To clear a number or cancel a call

CANCEL

CALL

To call a resident's flat

TRADES

Tradesman's Access

PRESS CANCEL
ENTER RESIDENTS NUMBER
PRESS CALL AND WAIT FOR REPLY

Speech Grill
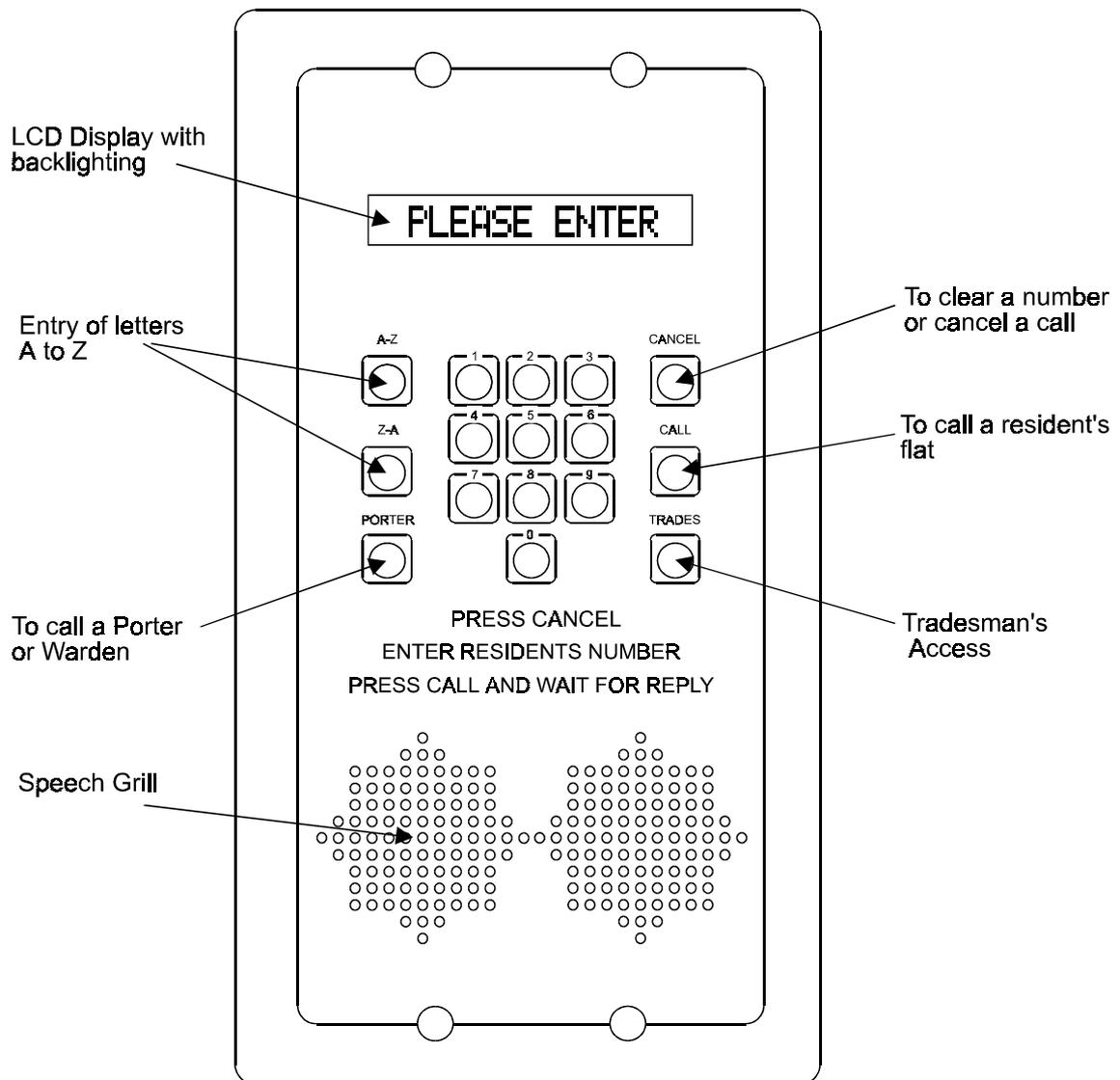
Diagram 2 DPX Door Panel

DM10 Display Module

The DM10 Display Module is an environmentally protected unit, manufactured with Zinc Passivated steel to BS1449 and including a secondary protective LEXAN window. The Display has a 16-character Liquid Crystal Display (LCD) with Backlighting and an 8mm character height, giving excellent visibility in a variety of lighting conditions, including night-time.

Model 51 Speech Unit

The Model 51 Speech Unit, positioned behind the grill of the DPX Door Entrance Panel, provides two-way speech communication between the door panel and telephone. It has a plastic cone loudspeaker and dynamic microphone, which provide excellent weather resistance. Both amplifier circuits use a custom designed hybrid circuit for high reliability. There are two controls at the rear for adjustment of speech volume levels.

DAX Control Cabinet

All of the DAX control equipment is installed in one or more IP55, lockable, steel cabinets.

The internal layout of the DAX Control Cabinets is illustrated in Diagram 3 overleaf and contains one or more of the following components:

- CTX64P Door Controller PCB
- EXP64 Expander PCB
- RLX8 Relay PCBs
- TS2000 Time-Clock
- Model PSU138B Power Supply Unit.
- Optional Lead-Acid battery (6AH)

CTX64P Door Controller PCB

The Door Controller PCB provides all the necessary connections for interfacing to one DPX Door Entrance Panel, as well as connections to the Electric Lock Release and optional Fireman's Switch, Sounder or Door Monitor Switch. One or two Door Controller PCBs are fitted in each Control cabinet. If two are present, they will be arranged in piggyback fashion, staggered to allow access to the connection terminals. The bottom PCB always has the lower door address / number.

The upper PCB will reveal a slide switch (marked RUN-PROG) which is provided to enable programming of various system parameters. (refer to 'Programming the Entrance Panels').
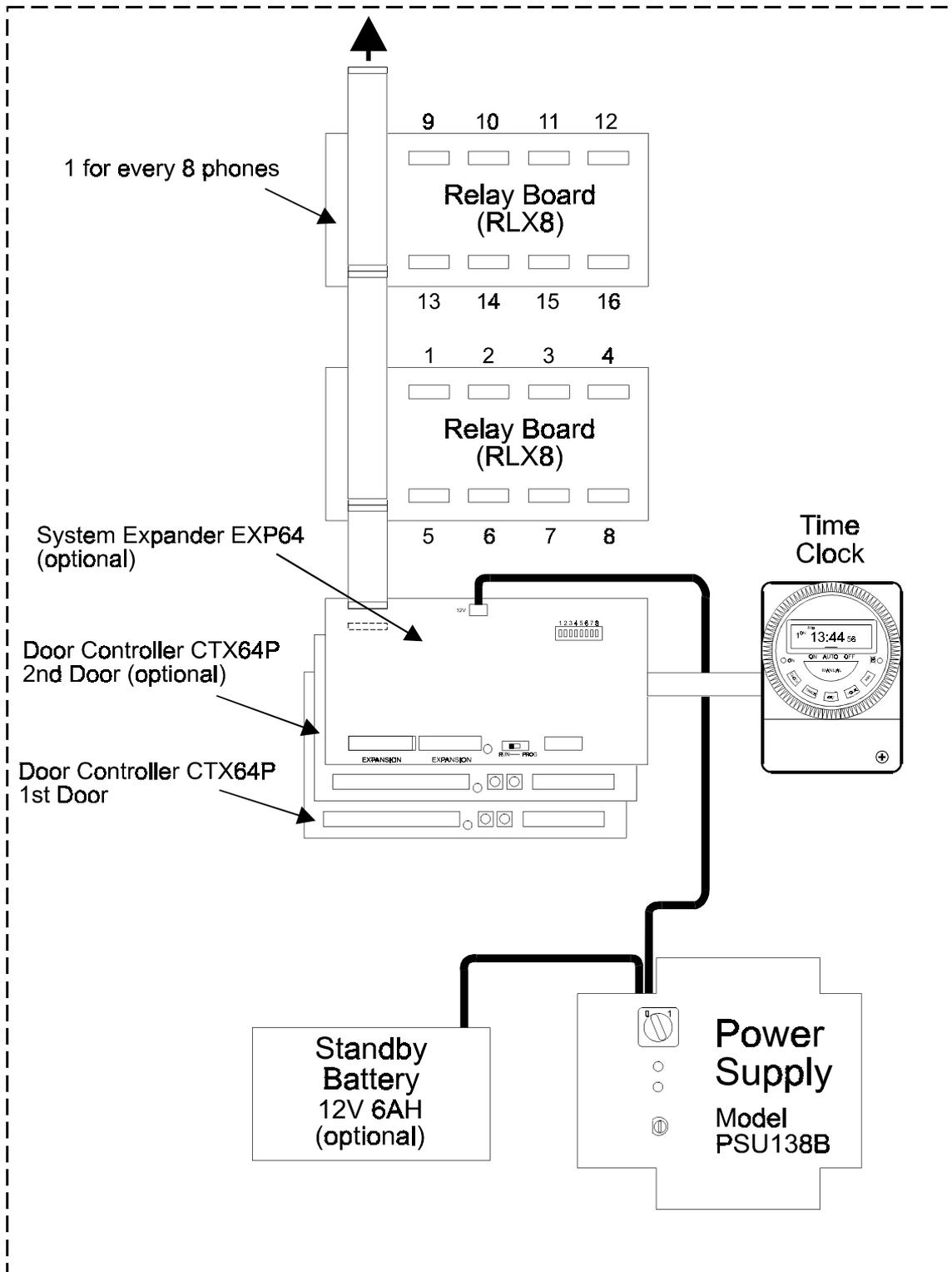
Diagram 3 DAX Control cabinet internal components

EXP64 System Expander PCB

An EXP64 System Expander PCB is required when there is more than 64 flats or more than two entrances per system. It provides the necessary interconnections to additional DAX Control Cabinets. The Expander PCB is always positioned on top of the CTX64P door controller PCBs (a Control Cabinet, provided purely for telephone expansion, may have a single EXP64 PCB and no CTX64P door controllers).

RLX8 relay PCB

Each RLX8 Relay PCB provides connections to eight telephones. There will be a maximum of eight RLX8 boards per cabinet allowing connection of up to 64 telephones. These will be clearly labelled 1 to (up to) 64. An LED is provided for each telephone which illuminates whenever that telephone is called.

The RLX8 PCBs provide complete isolation between telephones by means of relays and fuses. This ensures that any cable or equipment fault affecting one telephone will not impair operation of any other telephone within the system. To maintain full isolation a separate cable is required for each telephone. An alternative reduced wiring system is possible whereby a single cable is used for each relay board thus reducing the number of cables by a factor of eight; in this case isolation is maintained between RLX8 boards, so that a single fault can affect only a group of eight telephones.

TS2000 Time-Clock Module

The TS2000 Time-clock module is used to set time-periods when the 'TRADES' button is operative. It is programmable with up to 8 flexible on/off settings in a 24 hour or 7 day period. The TS2000 module has its own battery, allowing retention of the program during power failure.

Normally there is only one TS2000 module supplied per system. However it is possible to provide one TS2000 for each CTX64P Door Controller, should the time requirements for each Entrance be different.

PSU138B Power Supply

Each cabinet is separately power by an internal 12VDC/ 5A Regulated Power Supply Unit Model PSU138B. Battery Standby operation is possible with an optional 6AH, maintenance-free Lead-Acid battery. The PSU operates in 'Floating Charge' mode whereby the battery is connected directly across the power supply output. It has an active short-circuit protection at the 5A limit for mains operation and 6.3A fast blow fuse protection for battery operation.

An integral Two-Pole Mains Switch is provided to enable all other Cabinet components to be isolated from the Mains Supply during servicing. This Illuminated switch, together with red and green LED lamps, provide a clear indication of the Power Supply, Mains and Battery Status. On request, these Lamps can be repeated onto the exterior face of the cabinet.

Telephones

The following models of telephones are suitable for the DAX Digital Door Entry System, having the facilities as indicated.

Table 1 Compatible telephone models

Model	Buzzer mute switch with indicator	Timed buzzer mute with indicator	Door open indicator
500D/500PD*	No	No	No
500X/500PX*	Yes	No	No
500LX/500PLX*	Yes	No	Yes
500LXT/500PLXT *	No	Yes	Yes

On a **Fully Isolated System** (see Cable Planning, Page 18), the use of Privacy Telephones is unnecessary as 'privacy of speech' is inherent, due to the line isolation. Privacy telephones are recommended, however, when using the (partially isolated) **Reduced Wiring** system, to avoid the problems arising from Telephones being left off the hook.

System Expansion

A Control Cabinet is limited to a maximum of 64 telephone connections and two entrances. For larger systems additional Control Cabinets are required, each provided up to a further 64 telephone connections and up to a further two entrances. An expansion Cabinet may contain additional Relay boards (telephone connections) only, or additional Door Controllers only, or a combination of both.

Custom Specifications for the DAX Control Cabinets

Number of flats per Control Cabinet

Each control Cabinet is fitted with a number of RLX8 Relay boards giving multiples of 8 telephone connections upto a maximum of 64. Unless otherwise specified, each Cabinets will be filled with 8 Relay boards (64 flats) until the required number of flats is acheived. Control Cabinets can be supplied with a lesser numbers of Relay Boards to suit the layout of the building and the cables. However, as each control cabinet must have its own Power Supply Unit and Expander PCB, this will be a more costly option to the Customer.

Distribution of Door Controllers between Cabinets

Each Control Cabinet is fitted with 0, 1 or 2 Entrances (0 indicates an extension cabinet for extra telephones only).

By default, Door Controller PCBs 1&2 will be placed in Cabinet 1, and Door Controller PCBs 3&4 in Cabinet 2. In some cases the Customer may find advantage in a non-standard configuration: For example, on a 2-Door 128-way system; by placing Door Controller 1 in Cabinet 1, and Door Controller 2 in Cabinet 2, simultaneous operation from both Entrances is possible providing that the call from each Entrance is made to a telephone which is connected within the same Control Cabinet as the Door Controller.

Time-clock Modules

Standard systems are supplied with one TS2000 Time-clock module in Cabinet 1. If required, additional TS2000 modules can be supplied (up to 1 per Entrance) so that each Entrance or group of Entrances can operate with different time settings when using the Trades facility.

Selection of Flat Numbers

For each telephone the Customer may specify any four character Alpha-numeric flat number (one Alpha character only). Eg 7 2018 A421 B301 are all valid. The required numbering system is factory programmed and therefore must be provided by the customer at the time of order. These numbers may be presented in an entirely random sequence so that the telephone connections may be conveniently allocated between relay boards and between cabinets to simplify cable runs.

A printed form is available to assist in the presentation of the flat numbering scheme by the Customer.

A document entitled 'DAX Door Entry System Configuration Summary' is provided with each Control Cabinet showing the pre-programmed flat numbers and their corresponding telephone wiring locations.

Other System features

Lock Release

Each Door Controller PCB (CTX64P) provides two alternative pairs of connections for Electric Lock Releases:

FAIL SECR: for devices that require power to release the lock and will secure the door in the event of power failure. These are the most commonly used lock releases.

FAIL SAFE: for devices requiring continuos power to lock the door and release during power failure, includes magnetic locks.

Both Outputs are rated at 12V DC at a maximum current consumption of 0.5A. For a lock release or magnetic lock with higher rating or for AC operation, an additional Power Supply will be required. In addition a relay must be used to interface with the CTX64P Door Controller PCB. This is illustrated in diagram 9.

Egress button / Fireman's Override switch.

Each CTX64P Door Controller PCB has a pair of connections marked EXIT which may be wired to an external push-button for egress operation. Momentarily operating this button will directly operate the lock release for the programmed duration.

Alternatively the input may be used with a Fireman's Override Keyswitch. Closure of this switch will operate the lock release continuously; if this feature is used it is important therefore that the lock release be of a continuously rated type.

A normally-open switch or push-button with isolated (ie voltage-free) contacts is required.

The Egress/ Fireman's facility can operate the lock release for extended periods and requires a continuously rated lock release.

Tone Output

This output operates, during lock release operation (except Egress / Fireman's facility) or when a telephone is called. This is normally used to alert the caller, with a DC sounder placed in or near the door panel.

Two connections are required to the Door Controller PCB, marked 'TONE' and rated at 12V DC 100mA maximum. Positive connection is on the left.

Door Open Indication.

This feature requires the use of Model 500LX, 500LXT, 500PLX or 500PLXT Telephones. If a door is left open, this will be indicated on the green LED of the Telephones. The LED may be programmed to be steady or flashing, and to operate immediately, or after a delay.

On a multi-door system the Door Open Indication can be set to operate in either of two conditions:-

i) Any Door within the entire system is open.

ii) Any Door connected to the same Control Cabinet as the Telephone is open.

Each CTX64P Door Controller PCB has a pair of connections labelled 'DOOR SW'. These connections must be wired to a magnetic door-switch or the contacts of a Lock Release Monitor switch. Either normally-open or normally-closed switches may be used.

Cable Planning

Use 0.5mm solid-core twisted-pair telephone cable (BT specification CW1308, or equivalent) for all telephone and door panel connections; this is essential for correct operation of the system and for compliance with European EMC Directive 89/336/EEC. Avoid running any cables alongside mains or other data transmission wiring.

Twisted-Pairs

Twisted-pair telephone cable consists of several insulated conductors, arranged in pairs and lightly twisted together, and with an overall outer sheath. Normally the pairs are identified by a common colour eg blue on white/white on blue. A twisted-pair offers an improved immunity to pickup of noise, and a reduced emission of noise.

The following pairs of connections should each use a single twisted-pair

| 'R' and 'O' connections | - | Speech Unit to Door Controller |
| | - | Telephone to Relay Board. |

'0V' and 'D' connections   -   Display Module to Door Controller

'+S' and '-S' connections   -   System Expander to System Expander

'R' and 'T' connections   -   System Expander to System Expander

The Display Module '0V' wire should only be connected between display module and Door Controller and not used as a return for another part of the system.

Cabling systems to Telephones

Full Isolation

In order to provide full isolation between telephones, each telephone must use a separate cable. This is shown in Diagram 6.

Partial Isolation, Reduced Wiring

Diagram 7 shows an alternative wiring system which reduces the number of cables between the Telephones and Control Cabinets. The common cables of 8 telephones, together with 8 individual call lines, are looped from phone to phone and then connected to a single relay board. Isolation is maintained between relay boards, so that a fault on any telephone or associated cable can affect only seven other telephones.

Table 2 Cable connections

Connections to each Door Controller (CTX64P PCB)	Cores	Diameter	Max.Length	
Speech Unit (Door panel)	5	0.5mm	50m	
Keypad (Door panel)	8	0.5mm	50m	
Display Module (Door Panel)	3	0.5mm	50m	
Lock release (0.5A rating)	2	0.5mm 1.0mm	25m 100m	
Exit / Fireman's Switch or Door Open Switch	2	0.5mm	100m	
Tone Output/Sounder	2	0.5mm	100m	
Engage Lamp	2	0.5mm	100m	
Connections to Telephones (full isolation)				
500D Telephone	5	0.5mm	100m*	
500X Telephone	6	0.5mm	100m*	
500LX/500LXT Telephone	7	0.5mm	100m*	
Connections to Telephones (partial isolation)				
500D telephone	4+8	see table 3		
500X Telephone	5+8	see table 3		
500LX/500LXT Telephone	6+8	see table 3		
Connection between Control Cabinets (EXP64 PCBs)	6	0.5mm	100m*	

These restrictions are unlikely to be exceeded in most circumstances; if they present a problem please contact the Manufacturer for further advice.

* For systems with several Control Cabinets, the distance of each telephone added to the distance of its Cabinet from the most remote Cabinet should not exceed 100m.

Table 3 Partial Isolation Telephone Connection Distances

Core Diameter		Maximum Length		
V,O, L	R, T, Z, I	500LX/LXT or PLX/PLXT	500X or PX	500D
0.5mm	0.5mm	40m	100m	100m
1.0mm	0.5mm	80m	100m	100m
1.2mm	0.5mm	100m	100m	100m

Important Safety Information

Connections to the 240V AC mains supply must be carried out by a qualified electrician or similar competent person, and made in accordance with accepted safety practices. A two-pole switch (as provided by a Consumer Unit or Switch-Fuse) must be included to isolate both Live and Neutral during Installation or Maintenance. The circuit must be protected by a fuse or other current-limiting device, rated according to the capacity of the cable used, up to a maximum of 10A. Use only mains cable to BS6004 or equivalent, within the following specified limits:

	Min	Max
Conductor Diameter	1.0mm (0.8mm^2)	2.25mm (4mm^2)
Cable Diameter	4.0mm	8.0mm

The power supply is fitted with an internal mains fuse, and a battery fuse; always replace with the correct type and rating. The fuse must be of the 20mm glass type, approved to BS EN 60127 or equivalent:

Mains Fuse (time delay)	Battery Fuse (Quick Blow)
T1A 250V	F6.3A

Environment

The Control Cabinets must be placed in a protected indoor environment and not exposed to dripping or splashing. The Cabinet(s) must be secured to the wall with adequate fixings so that there is no possibility of it falling down.

Lead-Acid Battery (when supplied)

The Lead-Acid Battery for the Standby Power Supply is shipped in separate packaging. Care must be taken to ensure that the terminals of the battery are not shorted together by metal objects as this may constitute a Fire Hazard. The Control Cabinet is IP55 rated (to exclude dust) and is vented to avoid the build-up of gases. Do not block any vents which may be apparent.

Installation

Installing the cables

Before Installing any cables study the wiring diagrams, and read thoroughly the sections on 'cable planning', and the notes on equipment installation described below. The entire system of cables may then be installed in the building ready for fitting of the equipment.

Fitting the Control cabinets

The control cabinets are designed to be wall-mounted in a protected indoor environment such as an Electrical Cupboard. Position them within the building in such a way as to minimise the length of cable runs to the telephones and Entrance Panels. Ensure that there is a 240VAC mains supply available (via a Switch-Fuse or Consumer unit) and that there is easy access for maintenance.

Four holes are provided at the back of the cabinet for mounting to a vertical wall; ensure that the correct fixings are used for the type and construction of the wall; test the strength of the fixings before connecting the mains supply. Cable access is provided at the top with a removable plate. For drilling of cable clearance holes or conduit fittings, remove this plate from the equipment, to avoid metal particles from falling onto equipment.

Connect all signal cables according to diagram 5 in the appendix, observing the twisted pairs as described in the section 'Cable-Planning'. The cable for each telephone must be connected to the correct output of the RLX8 relay boards in the Control Cabinet, to enable it to operate from the required flat number. The RLX8 connections are labelled 1 to 64. The corresponding flat number is given on the 'DAX Door Entry System Configuration Summary' supplied. **If Partial Isolation telephone wiring is used with 500X series telephones (refer to page 18) each RLX8 PCB must have fuse FS1 replaced with a F1.5A Quickblow type.**

A 240VAC mains connection is required to the Power Supply (PSU138B). It is advisable to use a plastic conduit to protect the mains cable within the cabinet. To make the connections, remove the PSU lid by removing the four fixing screws. Feed the cable through the grommet and cable-clamp and connect the Live, Neutral and Earth Connections as marked. Secure the cable clamp, but do not over tighten. Refit the PSU lid. Do not connect the battery at this stage.

Fitting the Entrance Panels

Choose a position on the wall of the building as close as possible to the entrance, which allows easy access for cables. If possible, avoid an open, south-facing aspect for optimum visibility of the display throughout the day (ie avoiding direct sunlight). As a guide, mount the panel so that the display window is approx 1.6m above ground level.

Cut a hole in the wall slightly larger than the back-box but a clear margin smaller than the panel ; ensure there is a sufficient clearance for the cables if they are to exit from the top or bottom.

Extract the main panel from the back-box by removing the two vandal resistant bolts (a special key is provided) and place it where it is protected from damage. Secure the back-box to the wall with four heavy-duty fixing screws. Make sure there are no large gaps between the wall and the panel . Feed in the necessary cables through holes in the back, top or bottom of the back-box and make all connections in accordance with wiring diagram 5 in the appendix.

Before refitting the Entrance Panel ensure the Model 51 Speech Unit is correctly positioned and check (and adjust if necessary) the two volume controls are approx mid-way. Finally refit the Panel and remove the protective film from the display window.

Fitting the Telephones

All the Models of Door Entry Telephone described above, are designed to be Wall-Mounted. Position them approx 1.5m from floor level. Make a cavity in the wall and feed through the required cable. Remove the lid of the telephone by pulling it straight off. The cable should be fed through the access hole in the base of the telephone and the telephone secured to the wall with two fixing screws. Strip the cable to length and connect according to diagram 6 or 7 in the appendix. Refit the lid and then hang-up the handset ready for testing.

Testing and Commissioning

Turning the system on for the first time

Switch on each control Cabinet in turn, performing basic checks before moving on to the next:

With the battery still disconnected, switch on the mains supply and then turn on the Power Supply. The Power Supply ON/OFF switch should illuminate to indicate a health mains supply and a steady green Lamp will confirm correct operation of the PSU. As soon as power is applied, a Red LED will flash four times on the CTX64P Control Board (or EXP64 if present), again confirming correct operation. In the event of any difficulties refer to the section on troubleshooting.

Testing the Entrance Panel

Visit each Entrance Panel in turn and confirm operation of the LCD display by entering any flat number and then pressing cancel (refer to Operation page 3). If there is nothing displayed or there are unexpected messages, refer to the section on Troubleshooting.

System Programming

A number of system settings (eg lock duration, access code) may be customised during Installation; refer to the section on 'Programming the Entrance Panel'. It is advisable to program all Entrances to the required operation, at this stage, to avoid repeating the following tests.

Testing the Telephones

Refer to the Operating Instructions page 3; Two Engineers are required to perform these tests. Alternatively, use Test Mode: Page 37.

Work systematically through the flat numbers from the Printouts provided following the sequence of Relay numbers (1 to 64 on the RLX8 PCBS).

Call the first telephone checking that the telephone buzzer is audible and that two-way speech possible and is of good quality. Press the telephone lock button and check the lock release operates.

If the telephone is a 500X, 500 LX, 500LXT, 500PX, 500PLX or 500PLXT model, press the mute switch and check the red LED turns on and off.

If the telephone has a Door Open Indicator, open the door and check the LED illuminates or flashes.

Testing the Time-clock

Program the required time-periods for Trades operation by referring to the section 'The TS2000 Time-Clock Module'.

Testing the system on battery standby
(read the section on 'Important Safety Information')

When all system tests are completed, the Lead-Acid battery (if required) may be installed in each Control cabinet. The battery is placed on the bottom of the Cabinet and connected by two leads with spade terminals to the PSU138B Power Supply. Observe the correct polarity (red to positive; black to negative). The PSU should remain operating with a steady green lamp.

Now simulate a Mains failure by switching the PSU off (the switch should cease to illuminate). Battery operation should be confirmed with a flashing green lamp on the PSU. Confirm that the system continues to operate normally, by re-testing the system from one telephone. Re-instate the Mains.

Other Tests

The following additional tests should be performed to verify correct operation and programming of each facility if used on the system:

Porter button: Check this calls the correct flat for each entrance.

Door Monitor: Check that the Door Open Indicator on the telephones operate from the required doors.

Egress Button: Check that pressing this button operates the Lock release for the prescribed period of time.

Firemans switch: Check that operating this switch will release the door until the switch is turned off again.

Trades/Coded Access: Check that these features operate exactly as programmed; if required the time-clocks can be switched on or off manually to simulate the active time-periods.

Display Adjustments

The optimum viewing angle of the DM10 Display Module can be adjusted with a small screwdriver through a hole in the rear. Adjust the screw so that the characters can be seen as sharp as possible without the background starting to show, when the panel display is viewed normally. In most cases adjustment is not necessary.

If the display window in the module itself, or at the entrance panel, requires cleaning use a mild detergent and NOT an abrasive cleaner.

Speech Adjustment

The Model 51 Speech Unit has two pots at the rear for adjustment of Speech levels as follows:

Volume A: Speech level at the Entrance Panel
Volume B: Speech level at the Telephone

If feedback is experienced (a howl or a whistle) turn both controls to 'off' and slowly adjust each up in turn until a satisfactory level of speech is attained.

```
                    ┌──────────┐
                    │ Normal   │
                    │ Operation│
                    └──────────┘
                         │  'RUN-PROG'
                         │  set to 'PROG'
                         ▼
                    ┌──────────┐
                    │'ENTER CODE>'│
                    └──────────┘
                         │  Enter '1010'
                         ▼
              ┌────────────────────────┐
              │  Parameter 1           │
              │  'TRADE   1234*'       │
              └────────────────────────┘
       PORTER  ▲              │ TRADES
              ┌────────────────────────┐
              │  Parameter 2           │
              │  'LOCK TIME 5*'        │
              └────────────────────────┘
       PORTER  ▲              │ TRADES
              ┌────────────────────────┐
              │  Parameter 3           │
              │  'SPEECH TIME 60*'     │
              └────────────────────────┘
       PORTER  ▲              │ TRADES
              ┌────────────────────────┐
              │  Parameter 4           │
              │  'BUZZ TIME  0*'       │
              └────────────────────────┘
       PORTER  ▲              │ TRADES
              ┌────────────────────────┐
              │  Parameter 5           │
              │  'CLOCK ON  IMM*'      │
              └────────────────────────┘
       PORTER  ▲              │ TRADES
              ┌────────────────────────┐
              │  Parameter 6           │
              │  'CLOCK OFF  CODE*'    │
              └────────────────────────┘
PORTER ▼ PORTER  ▲              │ TRADES    ▲ TRADES
              ┌────────────────────────┐
              │  Parameter 7           │
              │  'PORTER    1*'        │
              └────────────────────────┘
       PORTER  ▲              │ TRADES
              ┌────────────────────────┐
              │  Parameter 8           │
              │  'DOOR SW   N/C*'      │
              └────────────────────────┘
       PORTER  ▲              │ TRADES
              ┌────────────────────────┐
              │  Parameter 9           │
              │  'DOOR DELAY  0*'      │
              └────────────────────────┘
       PORTER  ▲              │ TRADES
              ┌────────────────────────┐
              │  Parameter 10          │
              │  'DOOR FLASH  YES*'    │
              └────────────────────────┘
       PORTER  ▲              │ TRADES
              ┌────────────────────────┐
              │  Parameter 11          │
              │  'DOOR NUM   1*'       │
              └────────────────────────┘
       PORTER  ▲              │ TRADES
              ┌────────────────────────┐
              │  Parameter 12          │
              │  'MAX ADDRES   2*'     │
              └────────────────────────┘
       PORTER  ▲              │ TRADES
              ┌────────────────────────┐
              │  Parameter 13          │
              │  'TIME CK DR  1*'      │
              └────────────────────────┘
       PORTER  ▲              │ TRADES
              ┌────────────────────────┐
              │  Parameter 14          │
              │  'DIR BANK   3*'       │
              └────────────────────────┘
```

Changing a parameter

To enter a new value simply enter and press CALL.

Press CALL to toggle through parameter options.

Press CANCEL to return to the current value if the wrong value is entered.

'*' Indicates the value is current.

Pressing CANCEL when not altering a parameter returns to 'ENTER CODE>'

To return to normal operation set the 'RUN-PROG' switch to 'RUN'.

Diagram 4 Parameter selection

Programming The Entrance Panels

Entering Program Mode

- Set the **PROG/RUN switch** on any Door Controller or System Expander PCB to **PROG**; The Displays shows `ENTER CODE>`

- Enter the security code: **1010** (this protects against inadvertent use by a Caller).

- All other entrances will show `ENTER CODE>`. After 3 minutes of no activity this entrance will return to the same prompt.

Selecting a Parameter

- Refer to Diagram 4 opposite.

- On entering Program Mode, the first parameter is displayed.
  `TRADES    1234*`

- To step through to the required parameter press the 'TRADES' button. Press the 'PORTER' button to step backwards.

Changing a parameter

- If the Parameter has a numeric value, type the new value using the keys **0-9** and press the **CALL** button. If an incorrect value is entered press **CANCEL** to return to the previous value and then re-enter before pressing the CALL button. If a value is out of the allowable range the parameter will remain unchanged.

- If the Parameter has an option list, toggle through the options with the **CALL** button.

- An asterisk (*) is used to indicate that the displayed Parameter value/option is currently stored; use this to confirm acceptance of an entered value/option.

Programmable parameters

Parameter 1 - Trades code

Display: `TRADES    1234*`

Range: Any 4 digit code including a single A-Z character.

Default: 1234

Description: The code to enter a premises when the trades button is pressed to use the coded access function. Requires parameter 5 and/or 6 set to "CODE" to enable this function.

Parameter 2 - Lock release time

Display: `LOCK TIME    3*`

Range: 1- 20 seconds

Default: 5 seconds

Description: The time a lock release operates or continues to operate after a telephone lock button has been pressed, trades/coded access was used or the egress / fireman's switch was operated.

Parameter 3 - Speech time

Display: `SPEECH TIME  60*`

Range: 20 - 240 seconds

Default: 60 seconds

Description: The time for which two-way conversation is possible between Resident and Caller before the system automatically disconnects the line. During Test Mode this time is extended to 10 minutes.

Parameter 4 - Phone Buzz time

Display: | BUZZ TIME   0* |

Range: 0 - 10 seconds

Default: 0 seconds

Description   The time a telephone buzzer sounds after the caller has released the CALL or PORTER buttons to make a call.

Parameter 5 - Timer on access

Display: | CLOCK ON   IMM* |

Range: NO, IMM, CODE

                        NO   No access
                        IMM   Immediate access, no code required.
                        CODE   Code required.

Default: IMM

Description: Action required when the TRADES button is pressed whilst the Time-Clock module is ON.

Parameter 6 - Timer off access

Display: | CLOCK OFF   CODE* |

Range: NO, IMM, CODE

                        NO   No access
                        IMM   Immediate access, no code required.
                        CODE   Code required.

Default: NO

Description: Action required when the TRADES button is pressed whilst the Time-Clock module is OFF.

Parameter 7- Porter flat number

Display: PORTER   10A*

Range: Any Valid   flat number (4-digit alphanumeric). Use an invalid number (e.g. 0) to disable the porter facility.

Default: 0 (Disabled)

Description: The flat number which the "PORTER" facility calls when the PORTER button is pressed.

Parameter 8 - Door Switch Type

Display: DOOR SW   N/C*

Range: N/C or N/O

                            N/C   Switch closed when the door is closed.
                            N/O   Switch open when the door is closed.

Default: N/C

Description: Type of door switch used to indicate a door is open.

Parameter 9 - Door open delay

Display: DOOR DELAY   0*

Range: 0 - 240 seconds

Default: 0 seconds

Description   Delay time between the door first opening and a 'DOOR OPEN' LED illuminating on the telephone.

Parameter 10 - Door open indication

Display: ╔══════════════════╗
                    ║ DOOR FLASH   YES* ║
                    ╚══════════════════╝

Range: YES/NO

Default: NO

Description: Dictates whether the telephone 'DOOR OPEN' LED Indicator is
                    flashing or continuous when active.

Parameter 11 - Door number

Note: **This parameter is factory set and should not need adjusting.
                    Incorrect setting may result in temporary loss of system
                    operation, or partial operation.**

Display: ╔══════════════════╗
                    ║ DOOR NUM   1* ║
                    ╚══════════════════╝

Range: 1 - 32

Default: System dependant

Description: Address of the Door Controller currently being Programmed.

                    One controller in the system must have an address of 1. The
                    address of each must be unique and cannot be the same as a
                    System Expander phone bank address.

Parameter 12 - Maximum address

Note: **This parameter is factory set and should not need adjusting.
                    Incorrect setting may result in temporary loss of system
                    operation, or partial operation.**

Display: ╔══════════════════╗
                    ║ MAX ADDRES   2* ║
                    ╚══════════════════╝

Range: 1 - 32

Default: System dependant

Description: The highest address used by any Door Controller or System
                    Expander in a system. This must be set to the same value for
                    every entrance.

Parameter 13 - Timer door number

Note: **This parameter is factory set and should not need adjusting.**

Display: `TIME CK DR    1*`

Range: 1 - 32

Default: 1

Description: The address of the Door Controller, which has the required time clock directly connected.

Parameter 14 - System Expander Address

Note: **This parameter is factory set and should not need adjusting.**

Display: `DIR BANK     3*`

Range: 2 - 32

Default: System dependant

Description: The address of the System Expander (EXP64 PCB), or phone bank, directly connected (in the same cabinet) to this entrances Door Controller (CTX64P PCB). If no System Expander is present, this variable can be ignored.
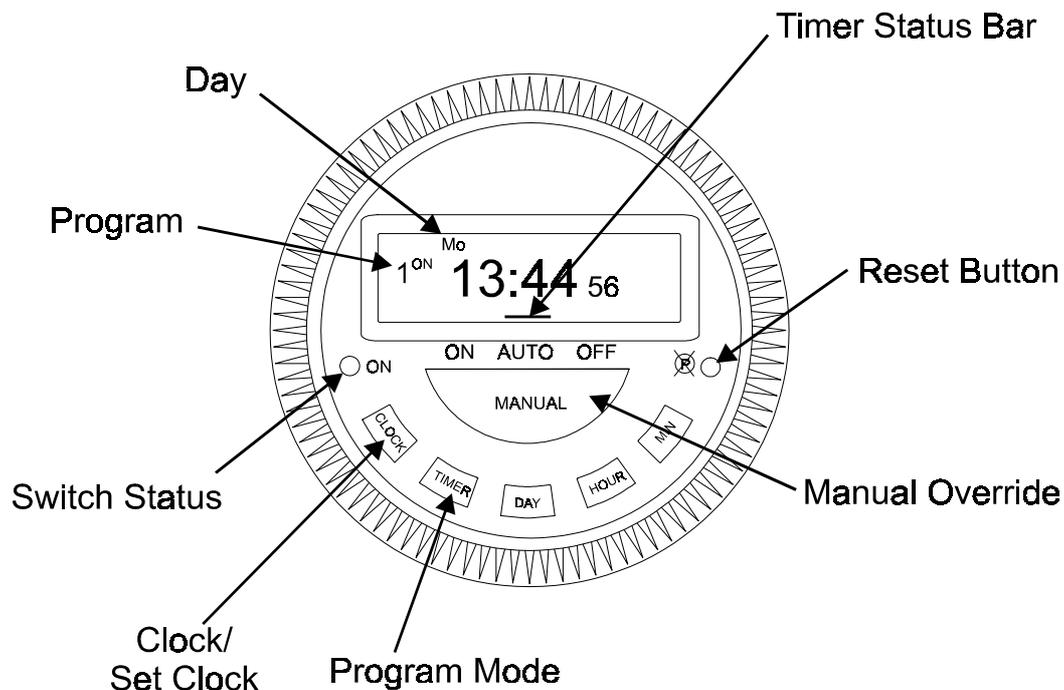
The TS2000 Time-Clock Module

This section describes the operation and programming of the TS2000 Time Clock module for use with the Tradesman's facility.

CAUTION

The unit is intended for 12V AC / DC operation only, and must not be connected to the Mains supply or used to switch Mains voltages.

Operation

N.B.   Before programming or setting the clock for the 1st time press the RESET button.

To set the current TIME and DAY:

1.   Hold |CLOCK| and press | DAY | until the correct day is displayed.

2.   Hold |CLOCK| and press | HOUR | until the correct hour is displayed.

3.   Hold |CLOCK| and press | MIN | until the correct minutes are displayed.

To set the programs:

1.   Press |TIMER| once, 1^{on} will appear. This displays the switch on time

        of the 1st program.

2.   Press | DAY | to select the program period. There are 15 settings:

        Mo+Tu+We+Th+Fr+Sa+Su   Mo+We+Fr
        Mo, Tu, We, Th, Fr, Sa, or Su   Tu+Th+Sa
        Mo+Tu+We+Th+Fr   Mo+Tu+We
        Sa+Su   Th+Fr+Sa
        Mo+Tu+We+Th+Fr+Sa

3.   Press | HOUR | to select the hour.

4.   Press | MIN | to select the minutes.

5.   Press |TIMER| once, 1off will appear. This displays the switch off time

        of the 1st program.

6.   Repeat steps 2,3 and 4 to set the off day and time.

7.   Repeat steps 1 to 6 to set the 2nd, and remaining programs, as

        necessary.

Reviewing the programs:

Press ⌷TIMER⌷ each time to toggle through the 8 on and off settings.

Manual Override

Press ⌣MANUAL⌡ to toggle through ON/AUTO/OFF modes as indicated by

the Timer Status Bar.

ON mode turns on the timer.
OFF mode turns off the timer.
AUTO mode runs the set program.
Switching from ON to AUTO will turn ON the timer until the next OFF period.
Switching from OFF to AUTO will turn OFF the timer until the next ON period.

Switch status LED indicator

This is a red LED which indicates the switch contact status. Connections 'CO' and 'NO' are closed when the indicator / timer is on.

Test Mode

Test mode is provided to enable an unaided Installer to make more rapid tests of the system when compared to the normal operating mode. It enables each telephone to be connected for an extended period whilst checks are made at the Entrance Panel, the Telephone and the Control cabinet. Speech connections can be rapidly stepped through for each Telephone (1 to 64) in each cabinet (1-4) , from either a single Entrance Panel, or Door Controller PCB.

To enter Test Mode:

●   Ensure all RUN/PROG switches are set to RUN.

●   Press the test button marked SW3 on the Door Controller PCB of the required entrance.

●   Test mode is confirmed by;

      1.   Door Controller PCB (CTX64P) LED flashing red (see Diagnostic LEDs).
      2.   LCD display showing `flat num     nnnn` , where nnnn is the first flat number on the system.
      3.   Connection made to the first telephone.
      4.   LCD display messages in lowercase.

●   All other entrances will be set to idle, disconnecting any calls in progress.

To exit Test mode:

●   Switch the RUN/PROG switch to PROG, wait for the LED to start an even flash then return the switch to 'RUN'.

●   Test mode is disabled approximately 10 minutes after the last key press.

Using Test Mode from an Entrance Panel

Enter test mode as above.

CALL: Pressing the button will buzz the current telephone and two-way speech is possible;The telephone lock button can be used to release the door and the telephone is re-connected immediately afterwards.

CANCEL: Pressing this button will display $\boxed{\texttt{flat num >}}$ allowing a new flat number, or starting point, to be entered.

PORTER: Pressing this button will connect and call the Porters flat.

A-Z: Pressing this button will increment to the next telephone

Z-A: Pressing this button will decrement to the previous phone.

Using Test Mode from a Door Controller PCB

Enter test mode as above.

Operation is essentially the same as from the Entrance Panel:

INC: Press **SW3** to step to the next flat.

CALL: Press **SW2** to buzz the phone.

Note: These buttons may be used alternately with the controls on the Entrance Panel as described above.

Diagnostic LEDs

A diagnostic LED is provided on each Door Controller PCB and System Expander PCB to indicate its current operating mode . Two diagnostic LEDs are present on each Power Supply.

Control PCB (CTX64P)

LED state	Operating Mode
Off	Operating Mode- Entrance is inactive
On continuously	Operating Mode - Entrance is connected to a telephone
1 second ON; 1 second OFF	Program Mode - Awaiting security code
Rapid Flashing	Program Mode - Data Entry
2 second ON; 1/2 secs OFF	Test mode- Entrance is connected to a telephone
2 Seconds OFF; 1/2 secs ON	Test mode - no entrance / telephone connected.

Expander PCB (EXP64)

LED state	Operating Mode
OFF	Operating Mode - No telephone connected within Control cabinet
ON	Operating Mode-Telephone connected within Control Cabinet.
Flashing (1sec ON; 1sec OFF)	Program Mode

Power Supply (PSU138B)

Steady Green Lamp	System running from the mains.
Flashing Green Lamp	System running from the battery.
Steady Red Lamp	Output off; Battery Charging.
Flashing Red Lamp	Output short circuit or battery low.

Troubleshooting

PROBLEM	PROBABLE CAUSE AND REMEDY
No/Low speech volume	• 'Vol A' or 'Vol B' adjustment required on the Speech unit. • Speech unit supply voltage low. Check 10-15V across 'C' and 'H' on the unit. • Cable fault on R&O, T&O connections of Telephone or Speech unit, or R, T, 0V connections between cabinets.
Constant tone/feedback when in use.	• 'Vol A' or 'Vol B' adjustment required on the Speech unit. • Speech unit is not tight against the panel grill or panel grill is blocked. • Missing 'O' connection on the telephone.
Telephone will not buzz.	• With a 500X,LX or LXT phone check the buzzer has not been muted (telephone red LED on). • Faulty O or I connection to telephone. • Telephone wired to incorrect Relay PCB (RLX8) connection. Check the 'DAX Door Entry System Configuration Summary' supplied. • Check the '+S' and '-S' connections between cabinets.
Door open indicator will not light. (500LX and LXT phones only)	• Door open local/any feature dipswitch set incorrectly, refer to table 4 in the Appendix. • Parameter 9, door open delay, set too long. • Faulty L or V connection to telephone. • Faulty connection to a door switch. Try shorting DOOR SW connections at the CTX64P PCB.
Using 'PORTER' button displays 'UNAVAILABLE'.	• Parameter 7 has not been set correctly.
Phone lock button does not operate lock release.	• Faulty connection on Z or O line. Try shorting Z to O at the RLX8 PCB, when telephone active. • Voltage drop due to inadequate cable to Lock.

Lock release operates all the time.	● If the lock is a 'fail safe' type it has been connected to a 'FAIL SECR' output. If the lock is a 'fail secure' type it has been connected to a 'FAIL SAFE' output. Try swapping the connections over. ● EXIT inputs permanently shorted together.
Display characters dim.	● Contrast adjustment set wrong. Adjust the screw on the rear of the display module.
Display blank at all times.	● No/low Display module supply. Check 10V-15V across +V and 0V on the module. ● Contrast adjustment set wrong. Adjust the screw on the rear of the display module.
Display shows ` ** NO MESSAGE **+ `	● Faulty D connection to Display module.
Pressing TRADES displays ` ACCESS DENIED ` when not expected	● Check the Time Clock module is correctly programmed and switched on. ● Check parameters 5, 6,13 are programmed correctly ● Check '+S' and '-S' connection between cabinets.
Pressing a Panel Key has no, or the wrong, effect.	● Faulty or incorrectly wired Keypad. Check all 8 connections between Panel and Door Controller are correct, use diagram 5 and 9 to aid.
Unable to use normal operation; display shows ` ENTER CODE> `	● A RUN/PROG switch is set to PROG; check all CTX64P and EXP64 PCBs on the system. ● Short circuit between PG and 0V connections
Supply voltage low (less than 10V, any system component).	● Short circuit. Check all control cabinets for a red flashing LED on a power supply. ● Systematically disconnect cables (except telephones) one at a time from the cabinets until the fault clears. Reset the power supply each time by switching OFF and ON. Check Battery fuse after fault has been cleared

Technical Specification

Max. telephones	256 (depends on no. of RLX8 PCBs fitted)
Max. entrances	4 as standard (depends on no. of CTX64P PCBs fitted)
Mains supply	230V AC +10% 50Hz
Power Consumption	120W Maximum per Control cabinet.
Operating Temperature	Entrance Panel: -11°C to + 40°C Control Cabinet: 0 °C to + 40°C
Power Supply Output	(PSU138B) 12VDC @ 4.5A
Fuses	External (battery) F6.3A (Fast blow). Internal (mains) T1.0A (anti-surge).
Battery (optional).	12V 6AH Lead-Acid, Maintenance free.

Appendix

Table 4 System Expander DIP switch

Table 4a Door open local/any feature

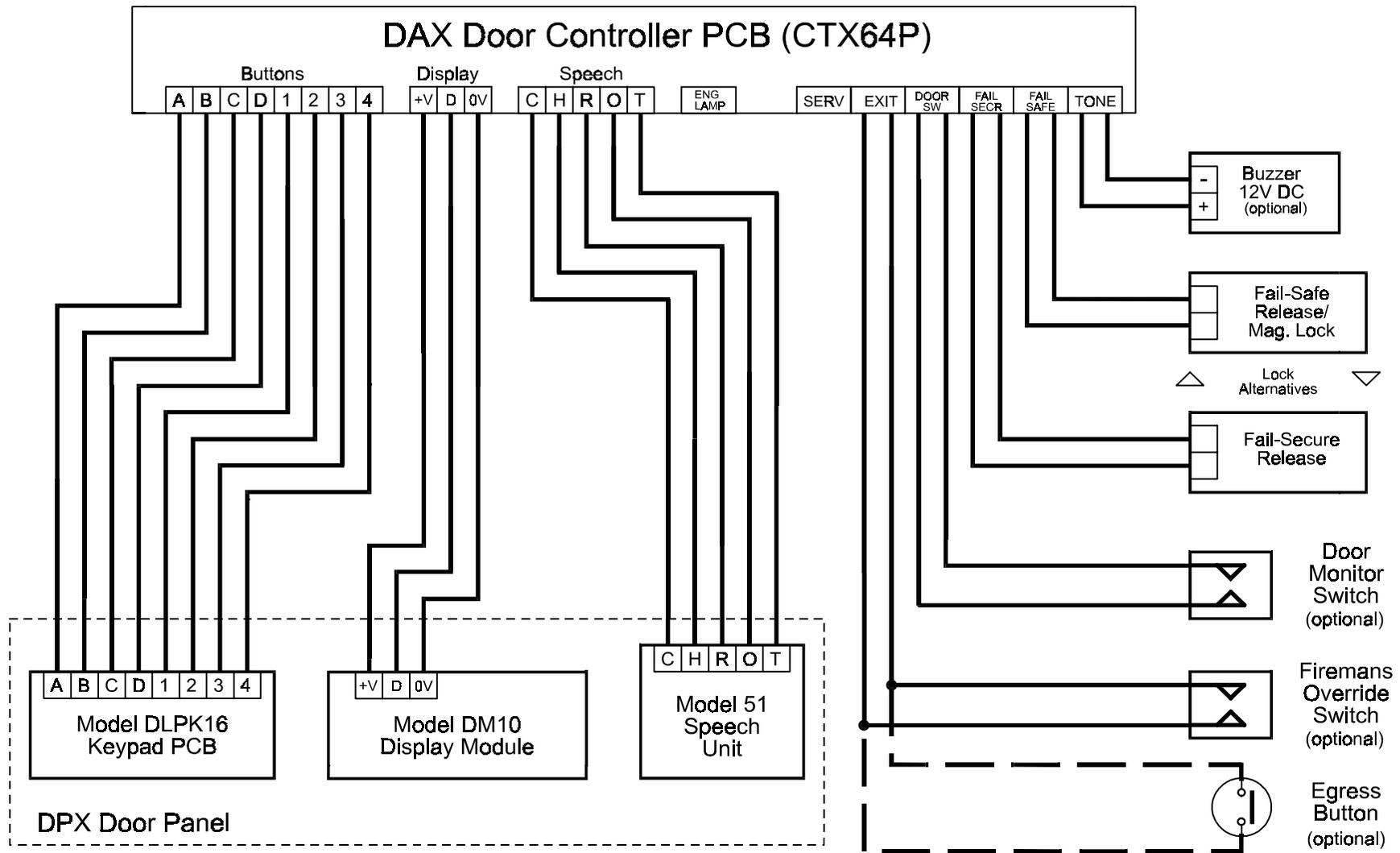| Door Open Condition	DIP Switch setting							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Local	X	X	X	X	X	X	X	1
Any	X	X	X	X	X	X	X	0

0 - Up   1 - Down
X - No affect on feature

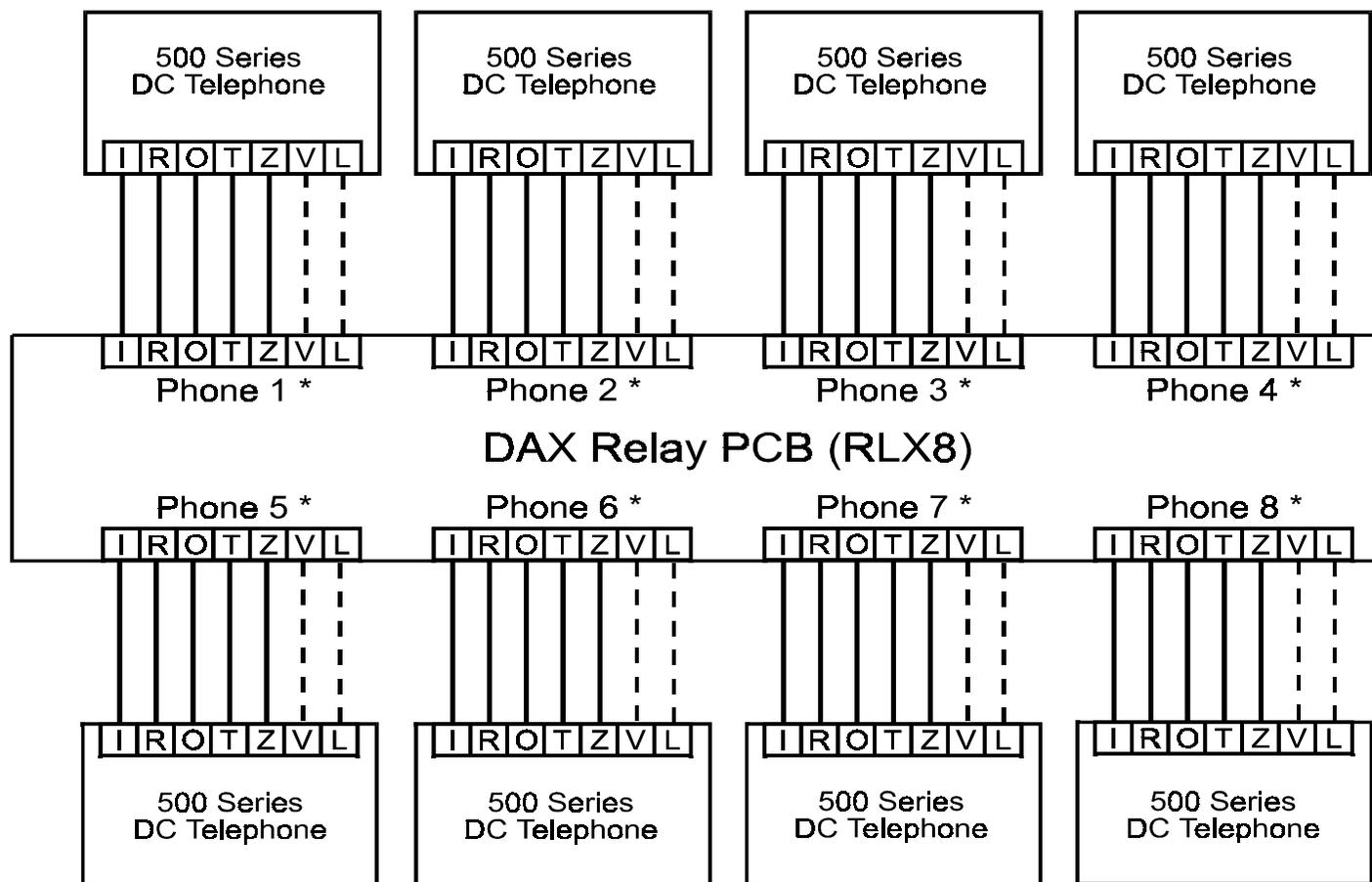## Table 4b Phone bank address

This is factory set and should not need altering. The address has to be unique and not the same as a door address (see parameter 11).

Bank Address	DIP Switch setting							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
2	0	1	0	0	0	0	X	X
3	1	1	0	0	0	0	X	X
4	0	0	1	0	0	0	X	X
5	1	0	1	0	0	0	X	X
6	0	1	1	0	0	0	X	X
7	1	1	1	0	0	0	X	X
8	0	0	0	1	0	0	X	X

0 - Up   1 - Down
X - Independent of setting

Diagram 5 Entrance Connections

Diagram 6 Telephone Connections for Full Isolation Wiring

500 Series DC Telephone

Terminals: I R O T Z V L

Phone 1 * Phone 2 * Phone 3 * Phone 4 *

DAX Relay PCB (RLX8)

Phone 5 * Phone 6 * Phone 7 * Phone 8 *

500 Series DC Telephone

* Relay PCB Numbering

PCB	Phones
1	1 - 8
2	9 - 16
3	17 - 24
4	25 - 32
5	33 - 40
6	41 - 48
7	49 - 56
8	57 - 64

Phone Connections

	No.	'V'	'L'
500D	5	✗	✗
500X	6	✔	✗
500LX	7	✔	✔
500LXT	7	✔	✔

Common Phone Connections

R O T Z V L

I (Phone 1) *1

I (Phone 2) *1   I (Phone 3) *1   I (Phone 4) *1

| I | R | O | T | Z | V | L | | I | R | O | T | Z | V | L | | I | R | O | T | Z | V | L | | I | R | O | T | Z | V | L |

Phone 1 *2 *3   Phone 2 *2   Phone 3 *2   Phone 4 *2

DAX Relay PCB (RLX8)

Phone 5 *2   Phone 6 *2   Phone 7 *2   Phone 8 *2

| I | R | O | T | Z | V | L | | I | R | O | T | Z | V | L | | I | R | O | T | Z | V | L | | I | R | O | T | Z | V | L |

I (Phone 5) *1   I (Phone 6) *1   I (Phone 7) *1   I (Phone 8) *1

*2 Relay PCB Numbering

PCB	Phones
1	1 - 8
2	9 - 16
3	17 - 24
4	25 - 32
5	33 - 40
6	41 - 48
7	49 - 56
8	57 - 64

Phone Connections

	No.	'V'	'L'
500D/PD	5	✗	✗
500X/PX	6	✔	✗
500LX/PLX	7	✔	✔
500LXT/PLXT	7	✔	✔

*1 Separate 'I' connection to each Phone.

*2 For 500X series telephones use only one 'V' connection per RLX8 as shown, and replace fuse FS1, for each RLX8, with a 1.5A Quickblow type.
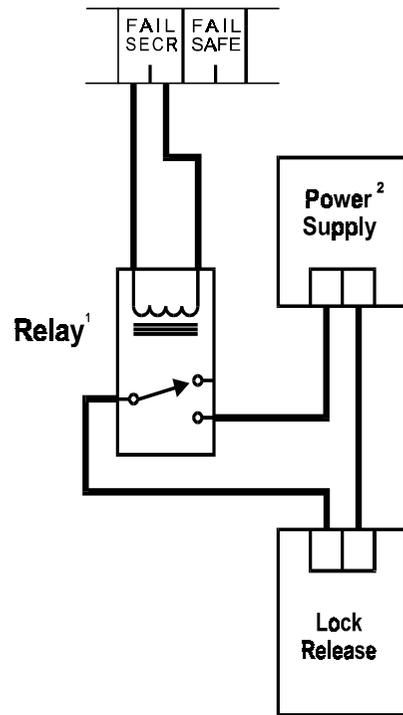
*3 Fuse FS1 must be replaced with a 1.5A Quickblow type.

## Diagram 7 Telephone Connections for Partial Isolation Wiring

Diagram 8 Connections between DAX Control Cabinets

The diagram shows four DAX Control Cabinets (No.1, No.2, No.3, No.4), each marked *1, containing a System Expander PCB EXP64. Each cabinet has terminal blocks labeled R2, T2, R, T, +S, -S, PG, 0V on both sides. Twisted-pair connections (marked *2) link the cabinets between R/T, +S/-S terminals, with PG and 0V also connected.
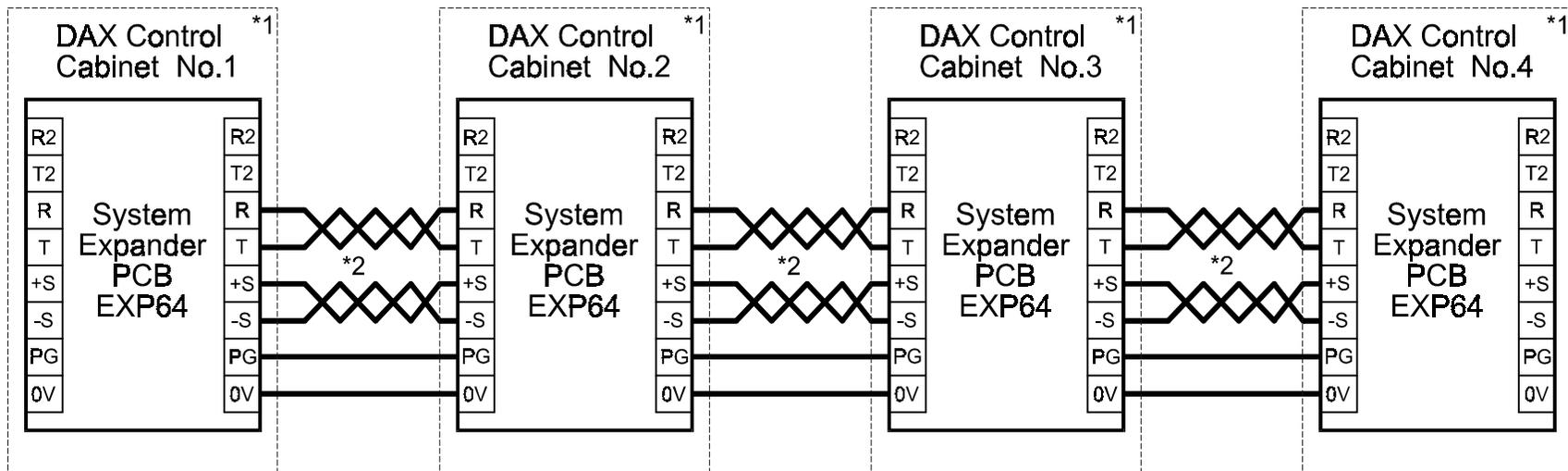
*1   Upto 64 telephones and 2 Door Controllers per cabinet.

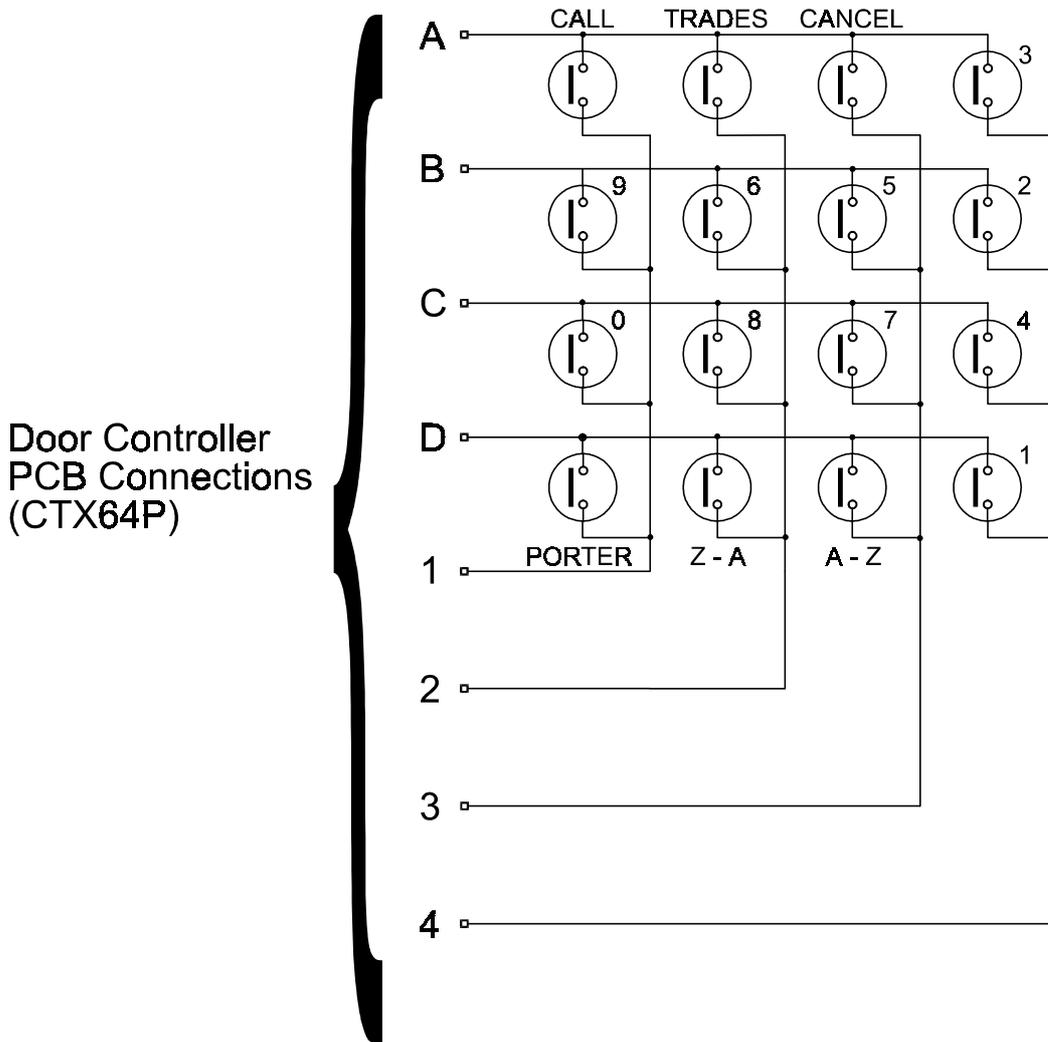*2   Use twisted-pair telephone cable.

Diagram 9a Fail-Secure
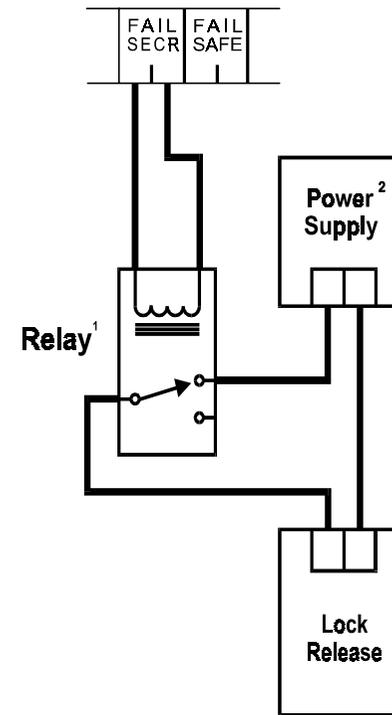
Diagram 9b Fail-Safe

Notes:

1. Single-pole changeover relay, contact rating as per lock release
   Lock release or contact must be supressed for EMI.

2. Power Supply is AC or DC and rated according to lock release
   requirements. (polarity is not usually important)

Diagram 9 High Current Lock Releases

Diagram 10 Keypad Matrix Connections