Bell System (Telephones) Ltd.

BSX

Isolated Audio Door Entry System

2 to16 Way, 1 or 2 Door

Installation & Operation Manual

This manual applies to the following BSX Systems: –

BSX 8   **– Up to 8 flats 1 Door**

BSX 8-2   **– Up to 8 flats 2 Doors**

BSX 16   **– Up to 16 flats 1 Door**

BSX 16-2   **– Up to 16 flats 2 Doors**

The systems are for use with :-

801 Audio Phone

BSLX Audio Phone

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BSX 8 System

801 Audio Phone

BSLX Audio Phone

BSX Isolated Audio Entry System

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Introduction

The BSX2 Door Entry Telephone System is designed for low rise blocks of flats in both the public and private housing sectors. It provides the means for visitors to call an individual resident within the building and to establish two-way speech communication (full duplex) with them. The resident is allowed full control over the callers' access to the building entrance by means of an electric lock or lock release.

The BSX2 control Unit provides Full Isolation between individual dwellings so that any damage sustained to an individual telephone or its associated cable will not affect the operation of the rest of the system. The isolation also ensures that conversations are totally private.

The BSX2 is available in four models with a capacity of up to 16 phones and 2 entrances. For larger systems please refer to the *digi*bell digital door entry system.

Features:

- High Quality Full Duplex Speech
- Full Isolation between Phones
- Privacy of Speech
- Disability Discrimination Act (DDA) compliance
- Vandal Resistant Stainless Steel Entrance Panels
- Output for Fail-safe, Fail-secure Lock releases
- Programmable Lock and Speech Time
- Trades facility
- Fully programmable Time Clock with auto BST adjustment
- Compatible with Models 801, 801S, BS-LX Phones
- Re-assurance Tone output for Call and Lock operation
- Ringer Mute (801S and BS-LX phone)
- Door Status Indication (BS-LX phone)
- Egress facility
- Lockable Steel Cabinets
- Battery Standby
- Diagnostic LEDs
- Removable connectors for ease of installation
- CW1308 cable

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Basic System Operation

Making a Call

The Entrance panel has a push button for each flat in the building, engraved with the associated flat number. A caller pushes the required button and the phone will start to ring in the flat; this ringing tone will also be heard at the panel. The ringing will continue for 30 Seconds* or until the phone handset is picked up.

Once the handset is picked up the resident can talk to the caller for up to 60S*. During this time the resident can press the lock button to release the door. An electric lock release will operate for a fixed duration of 3 Seconds* and speech will continue until the lock release has ceased operating. Alternatively replacing the handset on hook will finish the call.

Audible indication at the panel is provided both when the phone is ringing and when the door release is active. The door release tone has adjustable volume, while the ringing tone comes from the phone and is fixed.

Privacy

To ensure complete privacy of speech and freedom from interference from other residents, the audio and lock functions of the phones are disabled until the phone has been called.

Ringer Mute

Some models of phone have additional features such as Ringer Mute which can be activated during periods when the sound of the phone ringing would be a nuisance (e.g. baby sleeping, youths pressing buttons). See specific Phone models for more details.

Door Monitoring

Door Status Indication (Door Monitoring) is available on some models; when the entrance door is left open, an LED indicator illuminates on the phone. This function requires a door monitor switch to be installed at the door or in the lock release.

Trades (Optional)

If independent access to the building is required for tradesmen (e.g. Postman) then an optional Trades button can be fitted to the panel. When the Trades button is pressed the lock release will activate for 3 Seconds*. All the BSX systems have a Time Clock (with auto BST and battery backup) which can be used to restrict the operating hours of the Trades facility.

Second Entrance

On a system with two entrances the caller will be unable to ring any of the flats whilst the other entrance is already in use. The system will indicate busy by sounding an intermittent tone for 3 Seconds.

Egress

An optional Egress button can be fitted to the inside of the door to enable resident to freely exit the building. A momentary press of the button will operate the electric lock release for 3 Seconds*.

*Lock and Ring and Speech times are programmable at installation – see Page 14

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Equipment & Design Considerations

Summary of Equipment Required

Quantity	Equipment	Model	Description
1	Control Cabinet	BSX8	One entrance, 1 to 8 phones
		BSX16	One entrance, 9 to 16 phones
		BSX8-2	Two entrances, 1 to 8 phones
		BSX16-2	Two entrances, 9 to 16 phones
1-16 (1 per flat)	Telephones	801	Standard model
		801S	Basic model with privacy switch
		BS-LX	Full Feature Model Including Privacy and Door Monitor
1 per Door	Entrance Panel (with Trades Button)	VRPn, (VRPn+Trades)	Vandal Resistant Panel e.g. VRP8, (VRP8+ Trades)
		LCPn, (LCPn+Trades)	Laser-Cut Vandal Resistant Panel e.g. LCP10, (LCP10 + Trades)
1 per Door	Lock Release	210	Fail Secure Lock Release (12V)
		206	Fail Safe Lock Release (12V)
		Various	Call for further options
Other Optional Equipment			
1 per Entrance	Exit Button	5077	Surface Mount Exit Button
		5078	Flush Mount Exit Button
1 per Entrance	Fireman's switch	FS1-S, FS1-F	Surface or Flush
1	Battery	Bat01	12V 7AH Sealed Lead-Acid Battery

Entrance Panel

All Entrance panels are Vandal Resistant and made from 2.5mm marine grade (316) stainless steel. Each panel is fitted with a high quality Speech Unit (model 61) and low profile vandal resistant buttons. Panels are available up to 1 to16 buttons plus trades and include custom engraving details. They are supplied with 'tamper-proof' security screws.

The standard **VRP** series are available both Flush and Surface mounted.

The **LCP** series panels have a flush mounted design and offer additional Vandal Resistant features over the **VRP** series; the panel's outer bezel is welded to a stainless steel back-box whilst the inner removable panel has been 'Laser Cut' to ensure a minimal gap which prevents the insertion of tools.

Control Equipment

All the control equipment for each system is supplied in a wall-mountable, lockable steel cabinet. It includes all necessary control PCBs, a Power Supply with battery backup capability and a Time-clock to control Tradesmen's access. The cabinet should be installed in a protected indoor environment.

Phones

Model 801 Phone

The 801 and 801S are the standard models. Ring volume is selectable to Low or High with an internal jumper. The 801S ringer may also be muted in the event of nuisance calls;

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when the slide switch is in the mute position the ringer will not sound and the resident will be unaware of calls until the switch is returned to the normal position.

Model BS LX Phone

The BS LX phone has both Door Status Indication and a sophisticated Ringer Mute facility.

Residents may mute the ringing of the BS LX by pushing the mute button on the phone; a red LED illuminates as a reminder. Pushing the same button again will cancel the mute function. Phones can be individually configured to automatically cancel the mute after a pre-set time (2 min to 10 hrs.). While muted the phone will not audibly ring but the mute LED will flash to indicate a call. Ring volume can be pre-set with an internal jumper (3 levels).

Door Status Indication is provided by the Lock button which will illuminate green whenever the door is left open (a door monitor switch must be fitted).

Phone Options

All models of phone can be supplied with an inductive loop (IDL) to operate a hearing aid with a 'T' switch.

Extension phones etc.

The BSX allows up to two phones to be connected to each output. An RT27 extension sounder counts as one phone.

Extension sounders or strobes etc. that use their own power supplies, such as the SG1 multi-tone extension sounder or the FB31 strobe may be connected in addition to two phones.

Electric Lock Releases

The BSX system supports either Fail-Secure or Fail-Safe lock releases or electric locks of up to 1A rating at 12V DC.

Powered bolt, shoot-bolt or other more secure door locking systems may require the use of separate power supplies. Shoot-bolt systems for instance tend to require at least 1.5A peak current and this will require the use of an isolation relay and a separate power supply for the lock.

Fail-Safe Lock releases

Fail-Safe Lock Releases which include Magnetic Locks require power to lock the door and will therefore fail open in the event of a power cut. An exit (egress) button should always be fitted on the inside of the door; this should be a 'normally open' type.

Another issue to consider with magnetic locks (which cannot be mechanically overridden), is the possibility of being locked out of the building, due to lost codes, fobs or equipment failure. It is advisable to consider an alternate building entrance, or an externally accessible, secure keyswitch, or other reliable method of overriding the system.

Fail Secure Lock Releases

Fail Secure Lock Releases require power to release the door lock and will therefore remain locked in the event of a power failure. Fire regulations usually stipulate that the exit door should incorporate a door-handle or push-bar and not an exit button or thumb-turn.

Most fail secure locks are not continuously rated however if an electrical 'hold-open' system is used (e.g. for busy periods) then a continuously rated release must be selected.

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Exit (Egress) Button

An exit button is used to unlock the door for the pre-set lock operating time. The input on the controller is designed only for use with a normally open push button.

DDA Panels

The BSX system can meet the requirements of the Disability Discrimination Act (DDA). Several options are available if required.

In the flat the availability of extension sounder and strobe accessories is the main provision. Connection to other more specialist third party devices is also possible because the ring signal is presented as an intermittent 12V output. Bell System will provide technical information as required to those third parties, though this manual should be sufficient.

At the door panel reassurance tones are standard, however DDA panels with visual indication of Ringing, Speaking and Lock release via three LED's are available on request.

Either high visibility halo buttons or illuminated tactile buttons are available for the call buttons. The tactile buttons have raised illuminated numerals for the flat number; however there is a limited range of numbers available. (Contact sales for further information).

Cable Requirements

Use 0.5mm solid-core twisted-pair phone cable (BT specification CW1308, Cat5 or equivalent) for all phone 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.

Connections to each Door Controller	Cores	Section	Max.Length
Speech Unit (Door panel)	4	0.2mm²	50m
DDA indicators	4	0.2mm²	100m
Engage Lamp (Busy indicator)	2	0.2mm²	100m
Push-buttons (as per diagram)	<10	0.2mm²	100m
Lock release(0.5A rating)	2	0.2mm²	25m
	2	1.0mm²	100m
Lock release(1A rating)	2	0.2mm²	12m
	2	1.0mm²	50m
Exit / Door Open or Trades Switch	2	0.2mm²	100m
801/801S Phone	5	0.2mm²	100m*
BS-LX Phone	7	0.2mm²	100m*

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

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Power Supply Capability/Limitations

Type	Rating	Description
Cab3	2A Continuous 3A Peak	Used on 1 door systems with either fail secure or fail safe lock releases up to 1A. Sufficient spare capacity to supply a 200 coded access controller and/or a Pax1 proximity reader.
Cab5	4A Continuous 5A Peak	Used on 2 door systems with either fail secure or fail safe lock releases up to 1A. Sufficient spare capacity to supply a 200 coded access controller and/or a Pax1 proximity reader.

N.B. No extra equipment should be powered without first consulting the technical department.

Battery Backup

Space is provided in the cabinet to fit a standard 7AH battery to the power supply (both Cab3 and Cab5 models) to provide battery backup in case of mains supply failure.

Backup time depends largely upon the idle power usage of the system which can vary widely according to the following factors: - lock type, the number and type of phones, door status indicator (on or off), the number of door panels and any additional equipment which may be fitted.

The longest backup times are achievable with fail secure lock releases as these only take current while unlocking the door; backup times exceeding 8 hours for a single door and 6 hours for a two door system are possible for moderate usage, reducing if system usage is particularly high.

The use of fail safe lock releases will require individual calculation for back up time. For instance, a 2 door system with 1A maglocks should not be expected to last much longer than 2 hours.

Cab3 and Cab5 supplies do not support the use of batteries larger than 7AH.

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Installation

Important:

- Review the section headed 'Safety Information' on Page 31.
- Ensure that 'Design Considerations' on Page 7 have been understood.
- Refer to the wiring diagrams from Page 27 onwards.

General

The major components of the system are fitted with high quality pluggable screw terminal blocks. This enables all the connections to the system to be fully completed, whilst easily isolating individual pieces of equipment during testing and commissioning.

Fitting the Control Unit

All of the equipment within the control unit box is mounted on a removable plate. It is important that while the box is being drilled for cable-entry conduits and being secured to the wall that the equipment is removed to prevent metal swarf from falling onto PCBs.

The mains connection can now be wired as per the section entitled 'Safety Information' on Page 31 (Inside back page). Pay particular attention to earth connections.

Installing the Battery

The battery (if required) should be installed only after all tests on the system have been completed and any faults have been cleared. Take care not to inadvertently short out the battery terminals as the available current (200A) may burn or overheat cables and other metal objects. Once installed the battery is safe and fuse-protected. The battery sits on the base of the control cabinet and is connected to the free spade connections already provided. Ensure the correct polarity is observed; the red wire with the red spade terminal goes to the battery positive terminal (also red).

Ensuring that the battery is fully charged may save test time.

Entrance

The panel should be mounted at an optimum height of 1.6 m, measured between the ground and the top of the panel and is to be located on the wall adjacent to the main entrance of the dwellings. With flush mounting panels it is advisable to apply mastic to the top and side edges of the panel to prevent water ingress behind the panel, but not to the bottom edge. On construction sites the panel must be protected from corrosive substances such as 'brick acid'. The panel should be cleaned only with a damp cloth containing dilute detergent.

All connections to the entrance panel and doors are provided by the control PCB marked 'BSX2'; dual entrance models contain two controller PCBs, each of which is connected to one entrance as shown in diagram 1 or diagram 4.

Up to 16 push-buttons are wired to the control PCB as shown on Diagram 2. The buttons are wired with 1 common for each group of 8 buttons giving a maximum requirement of 10 cores.

If the panel has a Trades button fitted it is wired as a separate pair of connections to the terminals marked 'Trade'.

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Engaged lamp output

The engaged lamp output is on when the other door is busy (ringing or talking to a flat). The output can be used drive a busy indicator.

Electric Door Release

When installing lock releases please allow a little movement on the door, as operation will be impaired if fitted too tight.

The Control PCB provides a single pair of outputs for electric lock releases or maglocks. A switch on the control PCB selects fail safe or fail secure, refer to the "Door Controller Settings'.

'FAIL-SECURE' lock releases require power to release the door and therefore will secure the door in the event of power failure.

'FAIL SAFE' lock releases and maglocks both require continuous power to lock the door and thus will release the door if power fails.

Both outputs are specified at 12v DC with a maximum current consumption of 1A. For electric lock releases of other types or specifications please contact the manufacturer for information on interface adaptors.

N.B. Magnetic locks (maglocks) must be fitted with a suppressor at the lock terminals. Some manufacturers fit an internal suppressor.

Trades Button

The Trades button is used in conjunction with the time clock to allow the door to be opened directly during certain hours. The Trades button is internally wired via the time clock to the Exit+ input. See "Exit Button" for further details.

Connections to the Phones

The phone connections are provided on the controller PCB. The connections are dual numbered, that is Phone 1 (9), Phone 2 (10) etc. The left hand PCB is always 1-8 and the right hand PCB if present is 9-16

There are 5 connections to each 801 phone and 7 connections to each BS-LX phone. A separate cable must be used for each phone.

Connections to each phone are protected with relays and fuses and have a diagnostic LED indication.

Door Monitoring Phone

For door monitoring the model BS-LX phone should be used. These phones are to be connected with 7 wires. The controller has terminals marked 'DOOR +/-' and this can be wired to either normally open or normally closed door contacts. There is a switch setting to select which type of contact is used.

Door Open Switch

The door open switch is used to provide an indication at the phone that the door has been left open. This switch can have closed contacts when the door is closed or open contacts when the door is closed, the choice being made in BSX2 Controller Settings Page 14. The default of 'contacts closed when door is open' must be selected when this feature is not required.

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Exit Button

The exit button input is for a normally open contact button. When pressed the Lock output will activate and the tone will sound for the Lock Time as set on the switches, see BSX2 Controller Settings on Page 14. If the exit input is triggered for longer than the lock time then the lock output will continue to operate until the input is removed. The tone will however stop after the lock time.

'Exit +' is the input and 'Exit –' is internally connected to 0V.

The 'Exit +' input can also be used to allow other equipment to release the door. Examples are shown on Pages 29 and 30.

If the exit button has a normally closed contact, then this can be wired in series with the release or maglock and break glass. This will allow the door to be opened manually, even if the equipment has failed, without having to break the glass.

Tone Output

Tone output is provided direct to the speech unit. The 801 and BS-LX phones generate their own ringing tone which is not adjustable.

Busy tone and Lock operation tone is generated in the controller and is adjustable using a volume control on the controller PCB (Page 27).

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BSX2 Controller Settings

These settings affect only calls etc. for that door PCB. Apart from SW1-5 both PCB's in a two door system should have the same settings. The two doors can have different settings, though in practice should not as it causes user confusion.

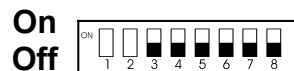See Page 28 for the PCB layout

Lock Time DIP SW1(1-2)

1	2	Offset
Off	Off	**3 Seconds***
On	Off	5 Seconds
Off	On	10 Seconds
On	On	20 Seconds

SW1

On
Off

Individual Functions DIP SW1(3-8)

SW1

On
Off

Switch	Function	Comment
DIP SW1-3	Ring Time	Off* = Ring Time is 30 Seconds On = Ring Time is 15 Seconds
DIP SW1-4	Talk Time	Off* = Talk Time is 60 Seconds On =Talk Time is 120 Seconds
DIP SW1-5	PCB Select	Off* = This PCB is Door 1, Phones 1-8. On = This PCB is Door 2 and/or Phones 9-16.
DIP SW1-6	Door contact type	Off* = Contacts closed when door is open. On = Contacts open when door is open.
DIP SW1-7	Engage Output	Off* = Power on when other door busy. On = Power off when other door busy.
DIP SW1-8	Lock type	Off* = Fail Secure Lock. On = Fail Safe Lock.

*Default setting.
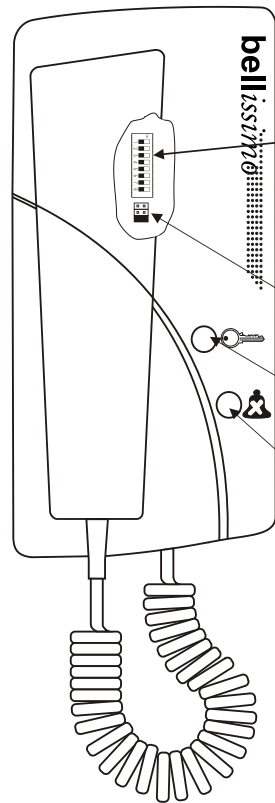
Tone Volume

The tone volume control affects lock and busy tones and can be adjusted as required including fully off.

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BS-LX Phone Settings

DIP Switch Settings

	Ringer Mute Times(5,6,7,8)		
	No Mute		1 hour
	2 mins		2 hour
	5 mins		4 hour
	10 mins		5 hour
	15 mins		6 hour
	20 mins		8 hour
	30 mins		10 hour
	45 mins		Toggle

Ring Volume (3 Levels)

Unlock button
and Door Status Indicator
(green)

Buzzer Mute button
and Ring Status Indicator
(red)

801xx Phone setting

The 801 has a jumper for ring volume with low and high settings. The jumper is at the top left of the PCB, has 3 pins and is marked Lo/Hi.

The 801S and 801PS have a switch at the right hand side to disable/mute the ringer.

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The TS2000-BST 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.

Programming may be carried out without 12V power applied, but all other operations, Override etc. need the Green Power LED to be lit. Also loss of 12V power may affect any override actions set by either the On/Auto/Off or Override buttons, but not any timer events even if they occur while power is removed.
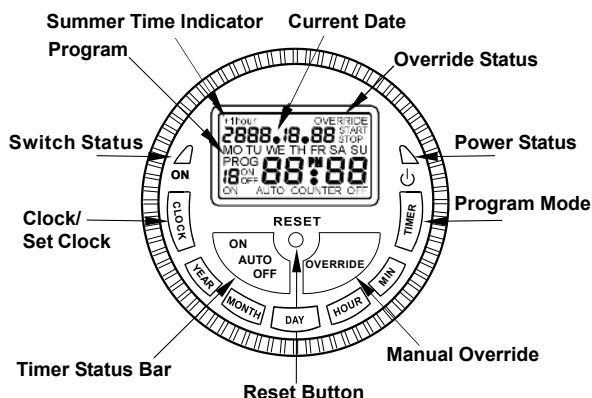
To set the current TIME and DAY

1. Hold 'Clock' and press 'Year' until the correct year is displayed.
2. Hold 'Clock' and press 'Month' until the correct month is displayed.
3. Hold 'Clock' and press 'Day' until the correct day is displayed.
4. Hold 'Clock' and press 'Hour' until the correct hour is displayed.
5. Hold 'Clock' and press 'Min' until the correct minutes are displayed.

To set the programs

1. Press once, 1on will appear. This displays the switch on time of the 1st program.
2. Press 'Day' to select the program period. There are 15 settings:

1. Mo+Tu+We+Th+Fr+Sa+Su   Mo+We+Fr
2. Mo, Tu, We, Th, Fr, Sa, or Su   Tu+Th+Sa
3. Mo+Tu+We+Th+Fr   Mo+Tu+We
4. Sa+Su   Th+Fr+Sa
5. Mo+Tu+We+Th+Fr+Sa

3. Press 'Hour' to select the hour.
4. Press 'Min' to select the minutes.
5. Press 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.

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Reviewing the Programs

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

Clearing the Programs

The only way of removing a program (e.g. 2 On to Off is no longer required) is to reset the time clock using the *Reset* button and reprogramming

On-Off-Auto

Press to toggle through On/Auto/Off modes as indicated by the Timer Status Bar.

On mode turns the relay On permanently.

Off mode turns the relay Off permanently.

AUTO mode keeps the current On or Off state until the next On or Off event as set by the timers.

Switching from On to Auto will leave the relay On until the next Off period.

Switching from Off to Auto will leave the relay Off until the next On period.

Manual Override

Press to toggle the relay between On and Off which will then continue until the next event.

LED Status Indicators

12V power is indicated by a Green LED with a Power symbol next to it.

A Red LED with ON next to it indicates the switch contact status. Connections 'CO' and 'NO' are closed when the LED is on.

Backup Battery

A CR2032 lithium coin cell is used as a backup battery. This battery will be used up by leaving the time clock unpowered and is easily replaced by prying its holder out using the screwdriver slots at the rear. Failure symptoms are the display going very dim or blank when 12V is removed, also the timer may reset back to 2004 during a 12V failure.

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Testing & Commissioning

Safety

Before switching on the mains spur, ensure that the connection is correctly made and that the cabinet is correctly earthed as per the section entitled 'Safety Information' on Page 31 (Inside back page).

Leave the battery disconnected for now. Apply mains power to the control unit and turn on at the power supply switch.

Basic Functional test

These tests require two people and assume the system is idle, watch out for buttons being pressed at the other door panel if it is a two door system. When a push-button on the entrance panel is pressed the associated Phone output LED, on the BSX2 PCB, will activate and a call cycle will commence with ring voltage being sent to the phone. Pressing the test button on the active door PCB will cancel the call, otherwise it will continue to ring for the set time of 30 Seconds or 15 Seconds.

N.B. Pressing the test button when the system is idle will activate the door lock and tone for 3 Seconds.

So for each phone on the system:-

1.   Call the phone being tested by pushing the appropriate button on the entrance panel; it should sound loud and clear.

2.   While the phone is ringing Mute can be tested.

      For an 801S slide the switch and the ringing stops, put it back.
      For a BS-LX press the button, it will flash to indicate ringing and the ringing should stop, press again to restart the ringing.

3.   Pick up the handset and talk to the person at the panel. Speech should be clear in both directions. On a BS-LX the Lock button on the phone should now be flashing.

4.   Now press the lock button. The lock release should operate for 3 Seconds (or the time set on the switches) and then immediately disconnect the call (LED on relay board goes out).

Other panel functions such as DDA indicators can be checked while testing the phone, to prove that they indicated at the right moments.

If the there is a second door panel it is only necessary to test it with one phone and carry out the speech and lock test while observing the DDA indicators, if present. To test the busy indicator, if present, make a call at one panel and then try and make a call at the second panel while the first call is in progress. The busy indicator should be on during the other call and pressing a button should cause a busy tone to be sounded – assuming that the tone volume control is not turned fully down.

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Adjusting the 61 Speech Unit

The Model 61 Speech Unit has 2 volume controls:-

A (Speaker symbol): controls the speech level from phone to panel.

B (Microphone symbol): controls the speech level from panel to phone.

Initially set both controls to mid-position and adjust each in turn for optimum speech clarity. It should be noted that if either or both controls are turned too high there will be a howling sound caused by acoustic feedback. This problem may also be induced by allowing a space between the speech unit and the inside surface of the panel (i.e. grill).

Battery Tests

Now connect the battery.

Then test the system again with any phone, firstly with the mains on and secondly with it off. If the system fails to operate satisfactorily when the mains is switched off, then check the battery fuse inside the Cab3/5 and also the battery voltage (should be >10.4V, 13.8V +/-0.25V fully charged). If the battery voltage is low then allow it to charge for at least 30 minute and test again.

Cab3 or Cab5 power supplies can shut down their output for 15 minutes if the battery is very discharged.

For further power supply diagnostic information see the Troubleshooting section Page 20.

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Troubleshooting

Common Faults

A very high percentage of calls to our technical support number, regarding new installations, are resolved to faulty wiring. The reasons for these are various: -

Broken cores, especially short links, sometimes broken inside the insulation!

Connectors clamped onto the insulation instead of copper.

Wire in the wrong side of a rising clamp connection, the clamps need to be unscrewed far enough to stop the wire going "underneath".

Shorts or opens due to cables having been stapled or nailed through.

A common fault is wiring a connector left to right instead of right to left, or one or more twisted pairs the wrong way round.

Tip. The heads of screws on connectors are not a reliable means of making a connection with a meter, try pushing the probe into the wire entry point.

Preliminary Checks

Before proceeding with the following sections on troubleshooting please ensure that the controller PCB('s) are correctly configured for the model of BSX in use:

Model	Controller PCB	DIP SW1-5
BSX 8 (8 Way 1 Door)	BSX2 PCB (1 only)	OFF
BSX16 (16 Way 1 Door)	Door PCB (Phones 1-8)	OFF
	Expansion PCB (Phones 9-16)	ON
BSX 8-2 (8 Way 2 Door)	Door 1 PCB (Phones 1-8)	OFF
BSX16-2 (16 Way 2 Door)	Door 2 PCB (Phones 9-16)	ON

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Troubleshooting Lock Release problems

Use this section to diagnose incorrect operation of the lock release when operated from a phone or the exit button (see basic functional test Pg 27). Perform the additional tests as described below using the Test button on the PCB controller and diagnose from the table.

Test1: (Always use this test first to diagnose lock release problems)

- Press the TEST button on the Door Controller (when system is idle*).
- Confirm 'LOCK' LED goes on for 3S (fail secure) or off for 3S (fail safe).

- Confirm Lock Release operates for 3S.

Fault	Cause
LOCK does not operate but LED flashes for 3S.	• Faulty/incorrect connections to Lock (open- circuit). • Voltage drop due to cable too thin. • Lock release jammed due to over tight fitting.
Lock clicks but does not open; LED flashes briefly.	• Lock current is too high; PSU is resetting; check lock release specification (1A max). • Short-circuit on LOCK connections.
Maglock does not hold strongly.	• Voltage drop due to insufficient cable diameter.
Lock open/close operation is reversed.	• Check fail safe/fail secure SW1-8 selection matches the lock type.
Lock operates all the time.	• Normally closed switch used for exit button; replace with normally open switch. • Exit terminals are short-circuit.
Lock operates from the exit button but not test button or phone.	• Normally closed switch has been used for exit button.
Lock operates from the test button but not from a phone.	NB Phone must ring and be picked up before operating the lock button • Faulty connection to phone Z. • Stuck lock button
No Lock Tone at the door.	• R core is broken. • Lock Tone Volume turned down on BSX2 PCB. • Phone Speech volume turned down on 61. • No power to 61 speech unit.

Test2: (Use this test if the lock cannot be made to operate using Test1)

- Disconnect LOCK and EXIT by unplugging the terminal block at the controller.
- Press TEST button on the Door Controller (when system is idle*).
- Confirm 'LOCK' LED goes on for 3S (fail secure) or off for 3S (fail safe).
- Check Output Voltage at LOCK terminals:
     Fail Secure: LOCK voltage 12-14V for 3S returning to 0V

     Fail Safe: LOCK Voltage 0V for 3S (Normally 12-14V)

The LED and Output Voltage are correct under Test2:	Re-check lock connections and cable. • Test lock release on an independent PSU.
LED does not operate. No change in output voltage.	• Power Supply or Controller problems: Contact Technical support.

BSX Isolated Audio Entry System

Troubleshooting Call Problems

Use this section to troubleshoot problems with establishing a call (ringing and answering a phone) discovered during basic testing (Pg). As there are many possible causes testing should follow the four sections below in the sequence suggested.

1. Preliminary Checks

Phone does not ring when called.	• Ensure Phone is not muted. • Ensure Phone is on the hook • Check Ring volume PCB jumper is present
Phone does not flash when called	• Check phone is on hook. • Phones with a ring LED need 12V on V.
Phone resets when called (BS-LX). (Both lamps come on together)	• Cable too long or poor connection.
Phone is ringing but there is no ring tone at the door panel.	• Only Models 801 or BS-LX have this function • R connection missing or faulty • Speech volume turned down on Model 61.

2. Testing Push Button Operation

• Push the first call button on the entrance panel and verify the corresponding phone LED on the control PCB lights up.

• Before testing the next button press the test button on the PCB to cancel the call.

• If all Phone LEDs light up in response to the correct push button then proceed to the Section "Testing the Phone connections", otherwise proceed with the next section (3).

3. Checking for Button Wiring Faults

• First unplug all PCB connectors except the power connector (and the ribbon connector to the second PCB if present).

• Check SW1-5 is set correctly for each BSX control PCB (Page 14).

• Now use a short length of wire to simulate each button input according to the matrix shown in the "Wiring to Door – Push Buttons" (Page 28).

   E.g. to simulate button 1, momentarily short 'B1' to '1'.

• If each phone LED (on the BSX control PCB) lights in response to the corresponding input this verifies correct operation of the BSX2 control PCB; accordingly the fault (identified in section 1 above) must be in the pushbutton connections or associated wiring; use continuity testing to isolate the fault.

4. Testing the Phone Connections
   (phone does not ring when called)

BSX Isolated Audio Entry System

- Call the phone under test by pressing the required button and confirm by observing that the corresponding LED on the BSX PCB is illuminated

- Using a voltmeter:

    a) Check the voltage between I and O: +12V pulsing (The ring voltage)
    b) Check the voltage between V and O: +12V steady (Power for BS-LX model only)

Repeat the voltage test at various points as detailed below to diagnose the fault:-

Test	Result	Action
Test voltages at phone PCB	OK	Check phone by substitution
Otherwise:		
Test voltages at BSX PCB	OK	Faulty cable or connections
	If Not OK	Check fuse
Otherwise:		
Unplug phone connections; Test voltages at BSX PCB	OK	Faulty cable or connections
	If Not OK	Check fuse Call Technical

BSX Isolated Audio Entry System

Troubleshooting Speech Problems

The objective of this section is to verify the correct operation of speech from the picking up of the ringing phone. All previous sections are assumed to be correct and working.

The BSX2 PCB detects a phone going off hook, stops ringing and changes the DDA indicators from "Ring" to "Speak", speech should then be active.

Test: Ring a phone, listen at the door, then pick up the handset to verify speech.	
Phone keeps ringing quietly.	• T core broken between phone and panel.. • 61 Speech unit is faulty.
One way speech from door to phone only.	• Short circuit or broken T connection • Speaker volume turned down on Speech Unit. • Check Model 61 Speech unit (see below) • Check Phone by substitution (or see below)
One way speech from phone to door only.	• Short circuit or broken R connection • Microphone volume turned down on Speech Unit • Check Model 61 Speech unit (see below) • Check Phone by substitution (or see below)
Speech volume too low.	• Adjust speech volume control on Model 61. • Model 61 speech unit not aligned with holes in panel
Loud 'howl' at the entrance panel. (Acoustic feedback).	• Model 61 volume controls set too high. • Short-circuit from "R" to "T" • Alarm cable used or "R&H" or "R&O" not in twisted pair • "R" twisted with "T" instead of "H" or "O"
Other noise or interference audible at the entrance panel.	• Alarm cable used • Adjacent data cable

Testing Phone and/or Speech unit

To test either a phone or a speech unit ensure 12VDC is correct at C (+) & H (-), then temporarily connect R O T of the speech unit to R O T of the phone with a short length of cable, removing existing connections first.

Note 1: The BS-LX phone also requires V connected to C to operate.

Note 2: The BS-LX and 801P phones will only work for two minutes after being rung, so momentarily connect C to I or V to I.

There may be some feedback as the phone is very near the speech unit, but it should be possible to prove two way speech even without the help of a second person.

Mute Led does not come on.	• Phones with a ring LED need 12V on V. • Mute is disabled on the settings switch.

BSX Isolated Audio Entry System

Phone Characteristics

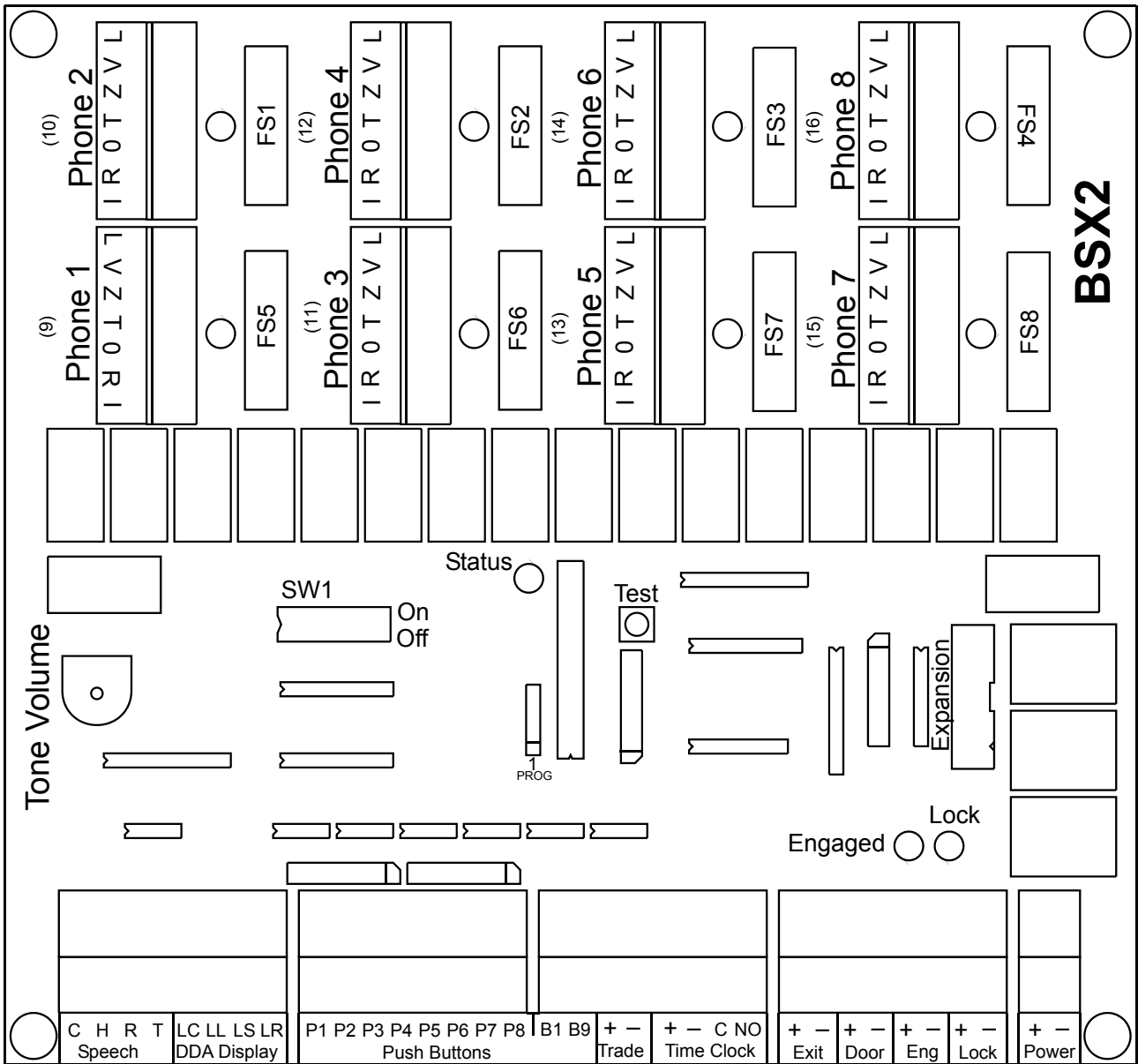| Phone	On Hook	Off Hook
801	Rings, volume depends upon jumper	Rings quietly.
801P	Rings, volume depends upon jumper	Rings quietly until time-out (approx. 2 minutes)
801S	Switch On – Rings, volume depends upon jumper Switch Off – No ring as I is disconnected	Rings quietly.
801PS	Switch On – Rings, volume depends upon jumper Switch Off – No ring as I is disconnected	Rings quietly until time-out (approx. 2 minutes)
BS-LX	Mute Off – Rings and flashes, volume depends upon jumper Mute On – No ring just Flash	Rings quietly
BS-LX No V	Phone resets at the start of each ring pulse, delaying ring. The short pulse causes truncated ring. Rings and flashes, volume depends upon jumper	Near instant privacy mute Effectively On hook for BSX2

BSX Isolated Audio Entry System

Specifications

BSX2 Controller PCB	
Size	190mm x 203mm
Supply Voltage	10V to 14V d.c.
Current Consumption	12mA idle 300mA ringing

801, 801P, 801S, 801PS Audio Phone	
Size	85mm x 212mm x 55mm
Supply Voltage	No direct supply. Ringer 12V a.c./d.c.
Current Consumption	145mA ring current.

BS-LX Audio Phone	
Size	105mm x 235mm x 25mm
Supply Voltage	10V to 14V d.c.
Current Consumption	25mA door open and muted, 145mA ring current.

TC2000-BST Time Clock	
Size	81mm x 136mm x 30mm
Supply Voltage	12V a.c., 10V to 14V d.c.
Current consumption	mA idle, mA active (relay on)

Model 61 Speech Unit	
Size	98mm x 60mm x 24mm
Supply Voltage	10V d.c. minimum, 15V d.c. maximum
Current consumption	100mA d.c. maximum

Cab 3 Power Supply – Battery Backed	
Size	140mm x 60mm x 53mm
Output Voltage (regulated)	13.5V Min, 13.8V Nom, 14.1V Max
Output Current	2A continuous, 3A peak (5 minutes max)
Mains Supply Internal Fuse	Not user replaceable
Battery Fuse	F6A3 20mm Glass or 6A self-resetting fuse.
Supply Voltage	230V 50Hz nominal
Temperature Range	0 ºC to 50 ºC

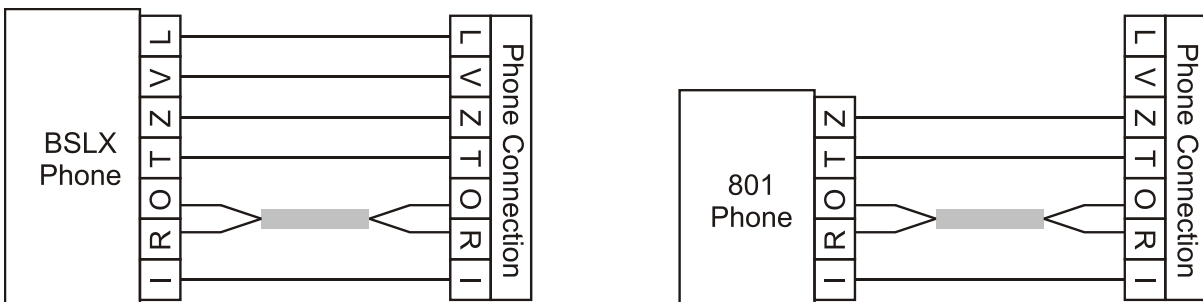| Cab 5 Power Supply – Battery Backed	
Size	350mm x 330mm x 80mm
Output Voltage (regulated)	13.5V Min, 13.8V Nom, 14.1V Max
Output Current	4A continuous, 5A peak (5 minutes max)
Mains Supply Internal Fuse	Not user replaceable
Battery Fuse	F6A3 20mm Glass or 6A self-resetting fuse.
Supply Voltage	230V 50Hz nominal
Temperature Range	0 ºC to 50 ºC

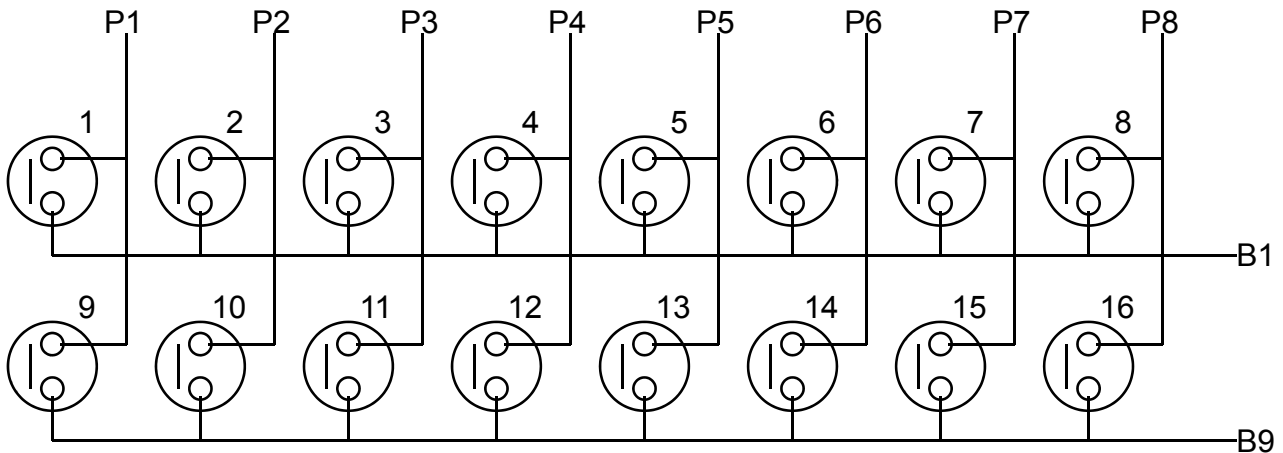# BSX Isolated Audio Entry System
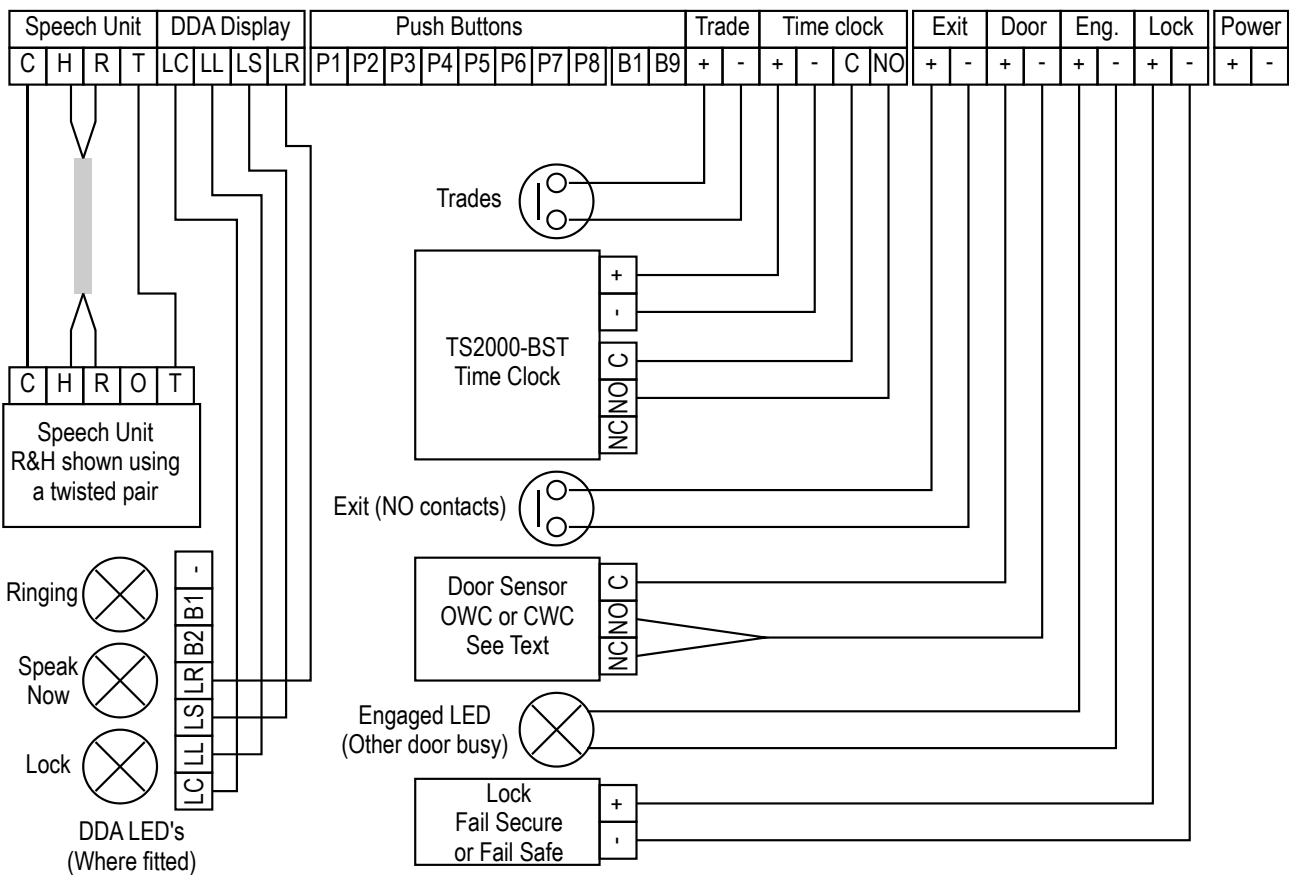
Wiring Diagrams

BSX2 PCB Layout

Wiring to Phones

Wiring to Door – Push Buttons

P1 P2 P3 P4 P5 P6 P7 P8

1 2 3 4 5 6 7 8

B1

9 10 11 12 13 14 15 16

B9

Wiring to Door – Panel and Door Equipment

Speech Unit				DDA Display				Push Buttons										Trade		Time clock				Exit		Door		Eng.		Lock		Power	
C	H	R	T	LC	LL	LS	LR	P1	P2	P3	P4	P5	P6	P7	P8	B1	B9	+	-	+	-	C	NO	+	-	+	-	+	-	+	-	+	-

C H R O T

Speech Unit
R&H shown using
a twisted pair

Trades

+
-

TS2000-BST
Time Clock

NC NO C

Exit (NO contacts)

Door Sensor
OWC or CWC
See Text

NC NO C

Ringing

Speak
Now

Lock

- B1 B2 LR LS LL LC

DDA LED's
(Where fitted)

Engaged LED
(Other door busy)

Lock
Fail Secure
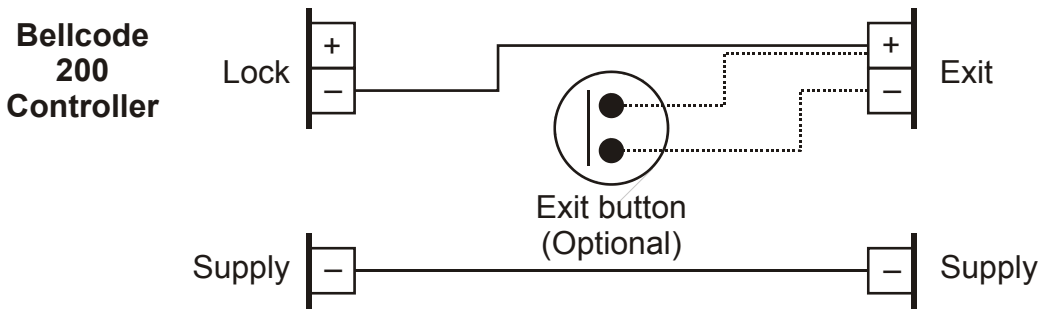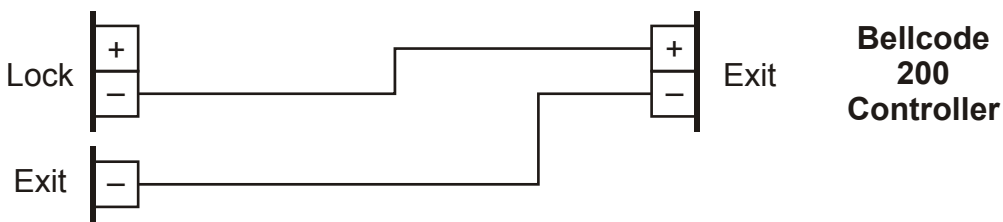or Fail Safe

+
-

N.B. The time clock is wired to 1 panel only, the signal is then internally routed to the other panel.

BSX Isolated Audio Entry System

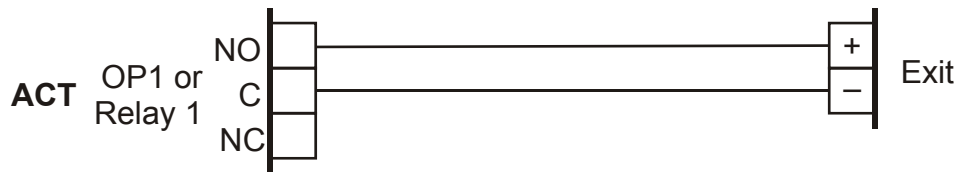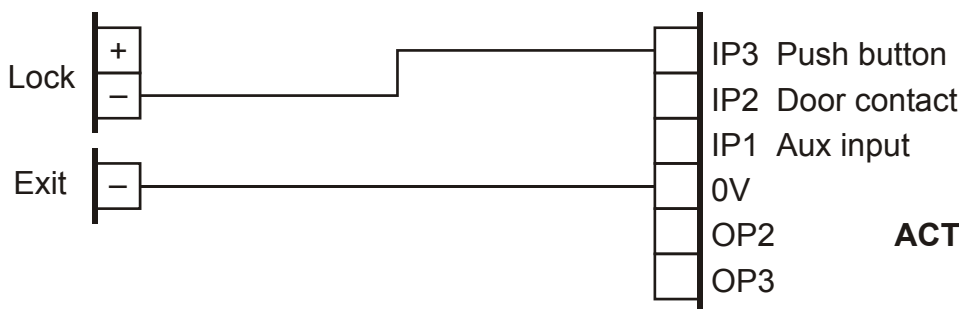## Connection to Bell 200 coded access – BSX Drives Lock

Bellcode 200 Controller

Lock [+ / −] ──────── [+ / −] Exit

Exit button (Optional)

Supply [−] ──────── [−] Supply

Connection to Bell 200 coded access – 200 Drives Lock

Lock [+ / −] ──────── [+ / −] Exit

Bellcode 200 Controller

Exit [−] ────────

Connection to ACT FOB access – BSX Drives Lock

ACT OP1 or Relay 1 [NO / C / NC] ──────── [+ / −] Exit

Connection to ACT FOB access – ACT Drives Lock

Lock [+ / −] ────────

Exit [−] ────────

IP3 Push button
IP2 Door contact
IP1 Aux input
0V
OP2 **ACT**
OP3

BSX Isolated Audio Entry System

Connection to Paxton FOB access – BSX Drives Lock

PAX1 Proximity Reader

Lock — +
Exit Z O
OV H
+12V C

Exit button (Optional)

Exit +
−

12V −
+

PAX1 Proximity Reader

Lock — +
Exit Z O
OV H
+12V C

Exit button (Optional)

Exit +
−

12V −
+
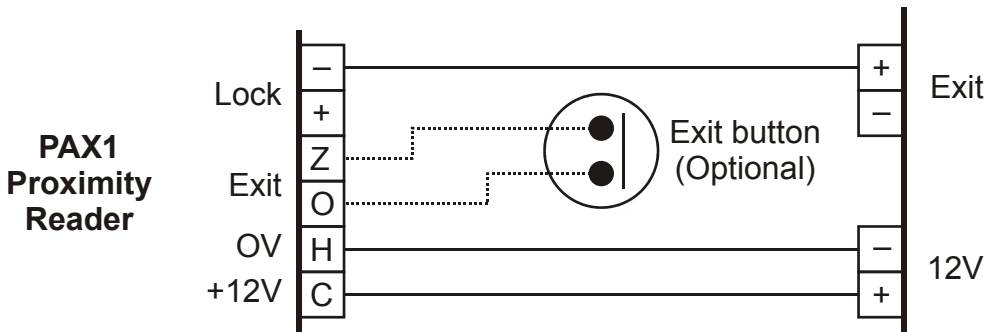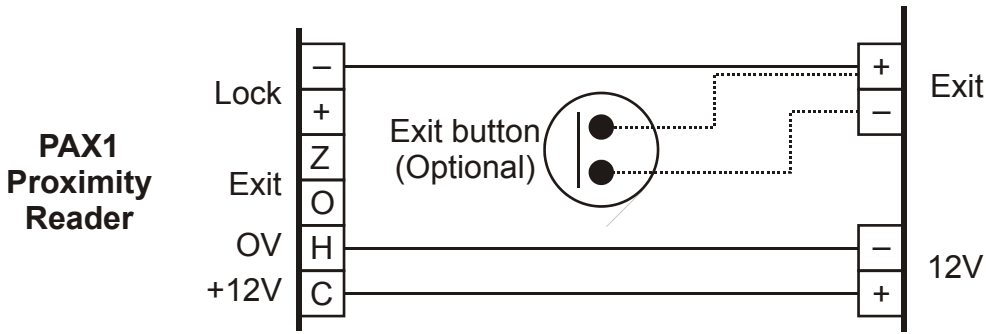
Connection to Paxton FOB access – Paxton drives Lock

Lock +
−

Exit button (Optional)

Z Exit Z
O Exit O

PAX1 Proximity Reader
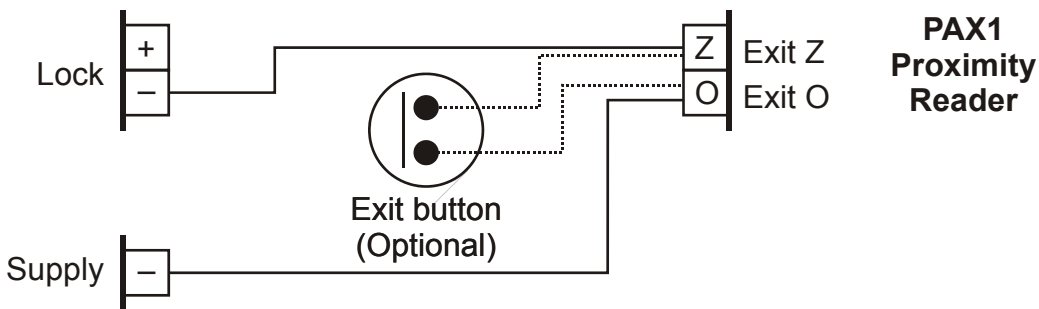
Supply −

Other Equipment to BSX – BSX Drives Lock

Third Party Controller Lock

Coil
Coil

88/89 Relay

Com
NO
NC

Exit +
−
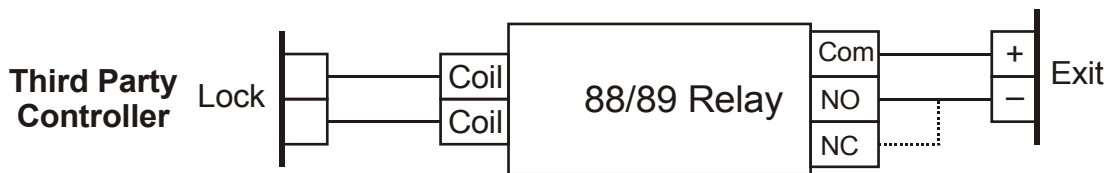
Other Equipment to BSX – Other Equipment Drives Lock

Lock +
−

Coil
Coil

89 Relay

Com
NO
NC

Volt Free Contacts For Gate ETC.
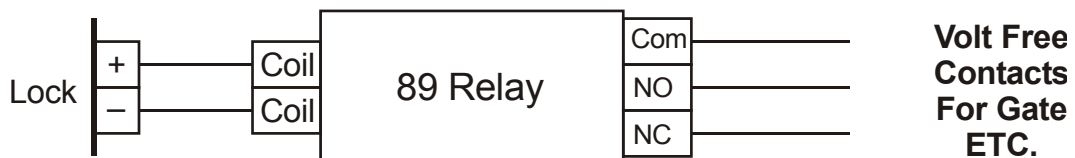
BSX Isolated Audio Entry System

Safety Information and Declarations

Connections to the 240VAC mains supply must be carried out by a qualified electrician or similar competent person, and made in accordance with current legislative requirements. 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

BSX2 Control Cabinet

The cabinet must be in a protected indoor environment, close to a 240V electrical supply, e.g. an electrical cupboard. 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. The cabinet should be fed from a two-pole switch (as provided by a Consumer Unit or Switch-Fuse) to isolate both Live and Neutral during Installation or Maintenance. The circuit must be protected by a current limiting fuse or other device with a maximum rating of 5A.

The cabinet power supply is protected by a fuse; always replace this with the correct type and rating as indicated on the power supply.

Earthing

A good mains safety earth must be connected to the cabinet and Power Supply.

The cabinet back-plate complete with all the equipment is normally removed to allow the cabinet to be fixed to the wall. When replacing this back-plate ensure that the earth bonding and any flexible earthing wires are properly reconnected.

Battery

Care must be taken to ensure the battery terminals are not shorted together by metal objects as this may constitute a Fire Hazard. Observe the correct polarity when connecting:

Red wire   -   Positive

Black wire   -   Negative

The Battery is protected by a fuse, always replace this with the correct type and rating as indicated on the power supply.

BSX Isolated Audio Entry System

Bell System (Telephones) Ltd.

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    technical@bellsystem.co.uk

Website: www.bellsystem.co.uk

Standards

This product complies with European directive 89/336/EEC on Electromagnetic Compatibility and Low Voltage Directive 72/23/EEC.

Emissions: Generic BSEN 50081-1

Immunity: Generic BSEN 50082-1

Low Voltage: Generic BSEN 60950

C E

BS EN ISO 9001:2000 Certificate number GB2000389