Application

The BEC Apartment Entry Intercoms provide two-way communications between the building entrance and each suite. Hands-free loudspeaker operation at the entrance/lobby panel and push button controlled communication at the suite/apartment locations provide for easy operation. Controlled door entry is permitted by push button operation at the suite in conjunction with electric door release.

Optional equipment is available to provide additional functionality, such as post office key door release, additional entrance panels, strobe light call indication and auxiliary relay for ancillary device operation (bells, lights, etc.).

Procedure

1. Read installation instructions to determine equipment location and installation methods.
2. Install housings (or back boxes) and wiring.
3. Check wiring, connect and install equipment.
4. Apply power and check operation.

Wiring

Suite/Apartment Stations

Stations may be connected in risers using the following cable configurations:

- **3-wire stations**: 1 twisted pair #22 AWG, plus 1 conductor #22 AWG per station in riser.
- **4-wire stations**: 1 twisted pair #22 AWG, plus 1 conductor #22 AWG, plus 1 conductor #22 AWG per station in riser.
- **5-wire stations**: 1 twisted pair #22 AWG, plus 2 conductor #22 AWG, plus 1 conductor #22 AWG per station in riser.

The maximum cable length is 400 feet (120 meters). Additional risers may be added as needed. Station cables must not be run in the same conduit with (or too close to) electrical wiring or background music, and must not be close to fluorescent lighting or other electrical equipment. Failing to observe this requirement can result in noise entering the intercom audio. Ensure that sufficient amounts of cable are left in the back box to make connections to stations.

Transformer

Cable wiring must be 2 conductor #18 AWG with a maximum cable length of 80 feet (25 meters). If using #14 AWG wire, this distance can be extended to 200 feet (60 meters). Route cable away from suite station wiring and maintain a minimum of 3 feet (1 meter) of clearance between the transformer and the amplifier.

Door Release

Cable wiring must be 2 conductor #18 AWG with a maximum length of 50 feet (15 meters). See Figure 2 on page 5 for specifics of each door control unit configuration. Note: An SS106 transformer must be used for 24 VAC doorstrike and 12 VDC Maglock applications (8 volt tap required).

Equipment Location

**Suite/Apartment Stations**

Locate suite stations (also known as remote stations) where convenient for use. Install a housing or back box at the desired location.

**Entrance/Lobby Panel**

Use the flush housing and trim frame for flush wall mounting. Locate the entrance panel where it is sheltered from weather.

**Intercom Amplifier**

Install the amplifier inside the entrance panel when using a flush mount housing. The amplifier must be installed outside the entrance panel when using a surface box and frame. Refer to Connections section, item #3, on page 2 for further details.
Connections

Before connecting to unit and applying power, verify that wires are free from shorts and grounds. Make connections as per Figure 1 on page 4. Observe the following notes:

1. Do not apply power to the transformer primary until the entire system has been installed and checked for shorts and grounds. The common wires connecting to terminals 1, 2, 3, E and 5 must show open circuit when tested with an ohmmeter.

2. Use twisted pair wiring as shown. Do not interchange wires or reverse polarity.

3. You may install intercom amplifier inside the entrance panel when using the flush housing. If it is necessary to install the amplifier elsewhere due to temperature extremes (operating temperature range is 0–30°C) or because the entrance panel is not large enough to house the amplifier, then use a 2 conductor shielded cable for the entrance panel speaker (connect shield drain to amplifier terminal G).

4. The amplifier must be located at least 3 feet (1 meter) from the transformer or other electrical devices.

5. Do not run wiring for station common wires and entrance panel speaker in the same cable and/or conduit. This will cause feedback on the system.

6. Door release wiring should be run separate from entrance panel speaker wiring.

Shunt and Dipswitch Settings

Set the dipswitches on the amplifier as per application requirements. See also Figure 4 on page 7. The selectable features and controls are as follows:

- **Shunt JP5** Install for maglock applications. Maximum current for maglock is 500 mA at 12 VDC, or 250 mA at 24 VDC.
- **Shunt J2** Place shunt across: 1–2 for doorstrike applications; 2–3 for maglock applications
- **Shunt J1** Place shunt across: 1–2 for +12 VDC maglock; 2–3 for +24 VDC maglock or AC/DC doorstrike applications
- **Short Door Time** Set SW1 to ON (right) and SW2 to OFF (left), 2 seconds
- **Medium Door Time** Set SW1 to OFF (left) and SW2 to ON (right), 10 seconds
- **Long Door Time** Set SW1 to OFF (left) and SW2 to OFF (left), 25 seconds
- **Entrance Tone** Set SW3 to ON (right) to activate this feature—must use warble tone
- **Postal Timer** Set SW4 to ON (right) and SW5 to OFF (left) to make postal control timer independent at 25 seconds
- **Amp Compatible** Set SW4 to OFF (left) and SW5 to ON (right) for PK543 drop-in replacement*
- **Door Hold Time Out** Set SW6 to OFF (left) to activate this feature
- **Talk Interlock** Set SW7 to OFF (left) to activate this feature (available for 4-wire stations only)

* For Amp Compatible mode, set SW4 OFF, SW5 ON, SW6 ON & SW7 ON. Also remove JP5 shunt, set J2 to shunt 1–2 and set J1 shunt to 2–3.

The Entrance Tone setting, when active, will generate a user feedback tone at the entrance panel when users press call buttons. If the warble tone is in use and the entrance tone feature is active, the tone will also be heard through the entrance panel speaker when the call button is pressed.

The Door Hold Time Out setting, when active, will allow the door control device (doorstrike, maglock, etc.) to time out normally, despite the DOOR button being held at the suite.

Safety Tip: The Talk Interlock setting, when active, will require that the TALK button (at the suite) is pressed before the DOOR button will activate the door control device.

Optional Accessories

Install optional accessories according to the instructions provided.

Finish & Test Installation

1. Confirm that all equipment is properly installed.

2. Connect power to transformer primary (120 VAC), and ensure that local electrical codes have been complied with.

3. At the entrance panel, push each button and verify that the correct suite is called.

4. At each suite, push the TALK and LISTEN buttons to communicate with a person at the entrance panel. Then push the DOOR button to confirm that the door release operates correctly.

Adjustments

Voice Volume and Tone Volume can be adjusted on the amplifier, via the access hole, with a small screwdriver.
Troubleshooting

(Refer to Figure 5 on page 8 for additional information.)

Entire System Dead
If power LED is not illuminated, check for 16 VAC at transformer secondary and 120 VAC at transformer primary. If LED is illuminated, review field wiring and perform direct test using one of the apartment stations to eliminate field wiring.

No Talk
Check wiring to terminals 1 and 2, and check whether wiring to entrance panel speaker is shorted or open. Suite station can be swap tested with another working unit.

No Listen
Check wiring to terminals 1 and 3, or for short between terminals 1 and 2. Check to see if wiring to entrance panel speaker is shorted or open. Suite station can be swap tested with another working unit.

No Door Operation
Check wiring to door release for shorts and opens, or for defective door release. Confirm that shunts are properly set for door release type and that connections to appropriate output have been made. Check wiring to terminals 2 and 3, or 1 and E (depending upon suite station type).

No Call Tone
Check wiring to terminal Z or ZW to entrance panel, related entrance panel call buttons, and suite station X terminal. Suite station can be swap tested with another working unit.

Excessive Hum or Distortion
Check whether wiring is installed too close to electrical wiring or electrical devices; amplifier installed too close to transformers or other electrical devices; twisted pair wiring not used as required; or amplifier voice volume set too high.

Radio Interference
Connect G terminal from amplifier to electrical ground. Note: This connection is not shown on the wiring diagram, since the situation is not always improved by adding it. If the problem persists, consult the factory or service representative.

Oscillation (feedback or howling)
Reduce the voice volume until oscillation is eliminated. If oscillation stops when the call tone wire is removed from ZW, set entrance tone (SW3) to the OFF (left) position.

Signal Flow and Theory of Operation
for the Amplifier and Apartment Intercom System

The following example describes an apartment intercom system using a amplifier in conjunction with a 4-wire suite station. Refer also to Figure 5 on page 8.

Call Button
Pressing a suite station call button on the entrance panel routes the call tone from the Z or ZW terminal on the amplifier to the X terminal (tone in) on the associated suite station. This signal then passes through the speaker and returns to the amplifier A via the 1 terminal (audio common). If the warble tone is in use and the entrance tone feature is active, the tone will also be heard through the entrance panel speaker when the call button is pressed.

Talk Button
Pressing the TALK button at a suite station connects the suite station’s internal speaker to terminals 1 and 2 of the amplifier, which serves as an audio input to the amplifier. The audio is then amplified and sent to terminals A and G, which are connected to the entrance panel’s speaker (speaker mode).

Listen Button
Pressing the LISTEN button at a suite station connects the suite station’s internal speaker to terminals 1 and 3 of the amplifier, which serves as an audio output from the amplifier. This allows the suite station to receive the amplified audio being received by the amplifier on terminals A and G from the entrance panel speaker (microphone mode).

Door Button
Pressing the DOOR button at a suite station creates a closure between terminals 2 and 3 on the amplifier. This state is sensed by the amplifier and causes the door release to be activated (output specifics are based on amplifier settings). This state is also triggered by shorting terminals 1 and E as is typically done by a postal lock.
Figure 1—Amplifier Wiring Diagram

Wiring for 3, 4 and 5 Wire Intercom Stations

3 Wire Intercom Station  
(Typical)

4 Wire Intercom Station  
(Typical)

5 Wire Intercom Station  
(Typical)

See note #4

Notes:
1. Use #22 AWG wire unless shown otherwise.
2. Warble or Steady Tone is hard wire selectable.
3. If entry panel has handset, connect it in place of speaker.
4. 3, 4 and 5 wire intercom station types may be used in any combination, with the exception of C devices.
5. Door release wiring should be run separate from entrance panel speaker wiring.
6. Shunts referred to in diagrams are located on amplifier.
7. Terminal P is for strobe only, do NOT connect other wires to this terminal.
**Figure 2—Doorstrike Applications**

**+24V AC Doorstrike Application:**
- Remove JP5 Shunt
- Set J1 shunt to 2 and 3
- Set J2 shunt to 1 and 2

**16V DC Doorstrike Application:**
- Remove JP5 Shunt
- Set J1 shunt to 2 and 3
- Set J2 shunt to 1 and 2

**+12VDC/500mA DC Maglock Application:**
- Install JP5 Shunt
- Set J1 shunt to 1 and 2
- Set J2 shunt to 2 and 3

**Note:** LP and 8 are each available on two pins of the JP3 connector. Brackets are provided to identify.
Figure 3— LED Applications

LED power from External Source

Model F and S Stations

LED power from Amplifier (Max 20 stations)

LED Power Calculations for Door Switch:
Each apartment station with a door indicator LED will draw 17mA when the door switch closes (caused by the actual building door being opened). The amplifier can supply a maximum of 20 apartment stations. If an external power supply is used then the overall number of apartment stations can be multiplied by 17mA (milliamps) to determine power supply load and switch maximum current rating.
**Figure 4— Amplifier Shunts and Settings**

A signal relay is used in conjunction with various open-voice and handset apartment intercom and video-intercom stations. The relay will provide a momentary dry contact relay closure, when the station is called, to operate ancillary devices such as strobes, bells or lights for handicapped tenants.

**Dipswitch Settings:** (right and left are referenced from the view above)

- **Short Door Time** - set SW1 to ON (right) and SW2 to OFF (left), 2 seconds
- **Medium Door Time** - set SW1 to OFF (left) and SW2 to ON (right), 10 seconds
- **Long Door Time** - set SW1 to OFF (left) and SW2 to OFF (left), 25 seconds
- **Entrance Tone** - set SW3 to ON (right) to activate this feature
- **Postal Timer** - set SW4 to ON (right) and SW5 to OFF (left) to make postal control timer independent at 25 seconds
- **Amp Compatible** - set SW4 to OFF (left) and SW5 to ON (right) to make unit for drop-in replacement for amplifier
- **Door Hold Time Out** - set SW6 to OFF (left) to activate this feature
- **Talk Interlock** - set SW7 to OFF (left) to activate this feature (available for 4-wire stations only)

* - For Amp Compatible mode, set SW4 OFF, SW5 ON, SW6 ON & SW7 ON. Also remove JP5 shunt, set J2 to shunt 1 - 2 and set J1 shunt to 2 - 3.
Figure 5—Theory Diagram

Example of internal connections of 4 Wire Intercom Station (most common station)

Installation Instructions and Wiring • Page 8
Installation for Multi Doors
Dual Entrance Control Unit

Application
The 2-DR Dual Entrance Control Unit provides a means to connect BEC Apartment Intercom amplifiers to more than one entrance. Voice and door release functions are automatically transferred to the calling entrance. The quantity of 2-DRs needed is equal to one less than the number of entrances.

Procedure
Warning: This switching unit will not function unless programmed for use—see Test Step #1.
1. Determine equipment location.
2. Install wiring.
3. Install equipment.
4. Check wiring and make connections.
5. Apply power and check operation.

Equipment Location
Locate the 2-DR within 3’ (1 m) of the intercom amplifier. If more than one 2-DR is used, install them all in the same area. Keep the 2-DR away from direct heat or extreme cold. Operating temperature should be between 10°F and 90°F.

Wiring
1. The first 2-DR will support two entrances; each additional 2-DR will support one additional entrance. For example, a three-entrance system will have two 2-DRs. See Figure 2 for an example with additional entrances.
2. Wire the suite station common wires to the amplifier, and wire the power transformer according to instructions supplied with the amplifier.
3. If more than one 2-DR is used, run 1 cond. #18 plus 7 cond. #22 between 2-DRs. Run 3 cond. #18 plus 3 cond. #22 from the last 2-DR to the amplifier.
4. Run 2 cond. #22 twisted shielded (2 cond. #22, plus 2 cond. #22 shielded for 205 amplifiers) from each entrance panel to the associated 2-DR.
5. Run multi-cond. #22 cable (use 1 cond. per suite station) from entrance panel to entrance panel, and from one entrance panel to the suite stations, as required by instructions supplied with amplifier.
6. From each entrance door release, run 1 cond. #18 to the 2-DR and 1 cond. #18 to the amplifier.
7. If a Post Office (P.O.) lock adapter is used, run 1 cond. #18 to the amplifier, and 1 cond. #18 to the associated door release from the P.O. lock adapter. In the wiring diagram, the P.O. lock adapter is shown connected to door release #1, but it may be connected to whichever door release is required.

Connections
1. Make connections as shown on the wiring diagram for the amplifier being used. (For the intercom amplifier, refer to Figure 1, Figure 2 and Figure 3. If more than two 2-DRs are used, break the connections going from the 2-DRs outside the dashed lines to the amplifier and insert the wiring shown inside the dashed lines for any additional 2-DRs.
2. If a P.O. lock adapter is used, do not connect it until a P.O. lock is obtained from the post office. When ready, make connections as shown on the appropriate wiring diagram.
3. Connect transformer to power source and follow the test procedures in the next section.

Test
After performing the test required in the amplifier’s instructions, do the following:
1. The 2-DR must be programmed to operate with the amplifier being used. Locate the programming switch and set switches as follows.
To use the intercom amplifier, set switches 2 and 4 on and switches 1, 3 and 5 off. Failure to set the programming switches properly will result in faulty operation, but will not cause permanent damage to the 2-DR.
2. Perform tests required in the amplifier’s instructions, then at each entrance, press a call button and observe the following:
a. The buzz tone should be heard at the called suite station.
b. If the Entrance Tone is enabled at the amplifier, then the buzz tone should be heard at the entrance panel.
c. Voice communication should be possible with the called suite station.

d. If the door button is pressed at the suite station, the door release should operate. When the door release time has passed, the 2-DR's red test light should be off.

3. If the P.O. lock adapter is installed, it may be tested by using a postal service key, or by operating the P.O. lock adapter micro switch if a key is unavailable. The door time delay on the amplifier does not affect the P.O. lock adapter.

**Troubleshooting**

If the system fails to operate properly, check all wiring. If the wiring is correct, check the troubleshooting points on the amplifier installation instructions. Then check the following:

**No buzz:**
Check wiring to terminal Z1 and Z2. If more than one 2-DR is used, then the entrance #2 buzz wire must connect to all 2-DR's.

**No voice communication:**
Check wiring to terminals S0, S1, S2, M0, M1 and M2.

**No door release:**
Check wiring to terminals D0, D1 and D2.

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**Diagnostic Test Procedure**

The 2-DR has a built-in test circuit. This step should normally be unnecessary, but to test the 2-DR do the following:

1. Set all programming switches off.

2. The red test light, located behind the wiring connector, should be off. If it is on, wait 3 minutes for time out, and it should be off.

3. Set programming switch #1 on. The red test light should be on.

4. Set programming switch #2 on. The red test light should be off. In a quiet location, a click may be heard as the internal relay operates.

5. Set all programming switches off. The red test light should remain on for about 2 minutes. It is not necessary to wait for it to go off unless busy light trouble is encountered.

6. Reset programming switches to the desired amplifier setting as shown in step 1 of the Test Section. Failure to set the programming switches properly will result in faulty operation.

If the test circuit fails this procedure, replace the 2-DR.
1. Use #22 wire unless shown otherwise.

Notes:
1. To convert a 502 to CT502, simply cut off the 6 pin connector.
2. The "Z" output can be used by relocating the Green & Green wire combination to the empty "Z" opening on the 6 pin connector.
3. Additional wires are provided on the 6 pin connector (K, C, & ZW (or Z)) to facilitate connection to additional PK502B units. If unused, these must be isolated and taped off.