WKP-1
Digital Matrix Intercom System
Industrial Keypanel

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Technical questions should be directed to:

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⚡	**CAUTION** RISK OF ELECTRIC SHOCK DO NOT OPEN	⚠
THE LIGHTNING FLASH AND ARROWHEAD WITHIN THE TRIANGLE IS A WARNING SIGN ALERTING YOU OF "DANGEROUS VOLTAGE" INSIDE THE PRODUCT.	CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER. NO USER-SERVICABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.	THE EXCLAMATION POINT WITHIN THE TRIANGLE IS A WARNING SIGN ALERTING YOU OF IMPORTANT INSTRUCTIONS ACCOMPANYING THE PRODUCT.

SEE MARKING ON BOTTOM/BACK OF PRODUCT.

WARNING: APPARATUS SHALL NOT BE EXPOSED TO DRIPPING OR SPLASHING AND NO OBJECTS FILLED WITH LIQUIDS, SUCH AS VASES, SHALL BE PLACED ON THE APPARATUS.

WARNING: THE MAIN POWER PLUG MUST REMAIN READILY OPERABLE.

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, GROUNDING OF THE CENTER PIN OF THIS PLUG MUST BE MAINTAINED.

WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPRATUS TO RAIN OR MOISTURE.

WARNING: TO PREVENT INJURY, THIS APPARATUS MUST BE SECURELY ATTACHED TO THE FLOOR/WALL/RACK IN ACCORDANCE WITH THE INSTALLATION INSTRUCTIONS.

∿	This product is AC only.
CE	

Important Safety Instructions

1.   Read these instructions.

2.   Keep these instructions.

3.   Heed all warnings.

4.   Follow all instructions.

5.   Do not use this apparatus near water.

6.   Clean only with dry cloth.

7.   Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.

8.   Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

9.   Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

10.   Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.

11.   Only use attachments/accessories specified by the manufacturer.

12.   Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

13.   Unplug this apparatus during lightning storms or when unused for long periods of time.

14.   Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

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Description and Specifications

General Description

Bosch has refined the look of multi-location security with the WKP-1 Industrial Keypanel. It offers simplified operation and integrates seamlessly with digital intercom systems (ADAM, Zeus, Zeus III and ADAM-M). The physical size and weather-resistant design provide a flexible, robust intercom system. The **GPI** (General Purpose Input) relay switch allows the user to set up door latching, unlatching, and other related actions by pressing a single button from any panel in the system.

Features

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Environmental -	The unit sustains exposure to rain, snow, and direct sun, allowing it to work in all environments. This keypanel operates in temperatures ranging from -30°F (-34°C) to 111°F (44°C). The mechanical design of the aluminum front panel and non-removable volume control knob provide a tamper-resistant product.
GPI Relay -	The WKP-1 has a local GPI relay 4-pin terminal contact closure to give the user the functionality such as latching, unlatching doors and other related functions with the press of a button.
Front Panel -	Single button interface for push-to-talk operation. There is a built-in, water-resistant speaker for listening capabilities. The panel has three (3) LEDs used to indicate power on, microphone on, and incoming call signaling.
Microphone -	The WKP-1 has a built-in water-resistant electret microphone. The microphone can be hot-mic enabled or disabled through the use of a dip switch setting.
Keypanel Assignment -	All key assignments, GPIO operations, and panel listen/muting functions are set for the intercom system through AZedit software.
Audio Control -	The front panel volume controls adjust the internal speaker listen level. An internal limit adjustment sets the lower level of minimum volume achievable.
Audio Processing -	An integral limiter/compressor insures the maximum intelligibility of the spoken word. The compressor uses the Bosch standard compression design.
Dual Power -	The keypanel can be powered locally through the 3-pin terminal or remotely via an RJ-45 connection from the breakout panel or remote power supply.

Front Panel Description
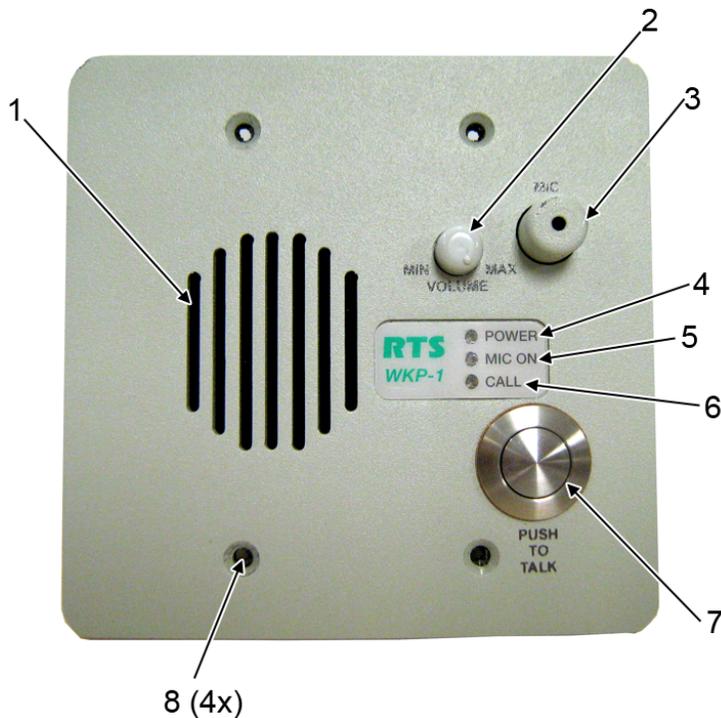
FIGURE 1. WKP-1 Reference View (Numbered items refer to front panel descriptions)

1. Speaker - The speaker is built-in and water-resistant to allow for dependable listening. An internal volume control allows the user to set a lower limit on the volume level, ideal for loud environments, such as loading docks and construction sites.

2. Volume Control - Controls the listen level of the speaker.

3. Microphone - Built-in, water-resistant, Electret microphone. The push-to-talk button allows a user to talk into the microphone and be heard at the other end of the connection.

4. Power Indicator LED - A green LED appears when the keypanel is on

5. Mic On Indicator LED - A green LED appears when Mic On is active.

6. Call Indicator LED - The PUSH TO TALK button activates the microphone for use and a green LED is seen.

7. Push-To-Talk Button - Used to switch the microphone on to enable the user to talk to the matrix.

8. Mounting Holes - The mounting holes fit any standard, 2-gang electrical box (3" depth minimum). The electrical box is not included.

Specifications

Matrix

  Input/Output

       8dBu nominal, 16dBu maximum

Panel Mic Input

  Mic Type

       Electret Condenser

  Nominal Level

       -44dB ±3dBu

  Directivity

       Omnidirectional

Speaker

  Output

       3 Watts

Power Requirements

  15VDC 400mA nominal (800mA maximum) for local power. 24VDC up to 800mA for remote power 300ft or more.

Connections

  RJ-45

       For use with Standard CAT-5 cabling

  RJ-12

       For use with RTS Matrix Standard 3-pair cabling

  Terminal strip for use with unterminated cabling

Size

  Width

       4.562" (115.87mm)

  Length

       4.5" (114.3mm)

  Depth

       2.525"(64.14mm)/2.7" (68.58mm) with cable attached

NOTE: The keypanel fits a standard 2-gang, 3" deep electrical box.
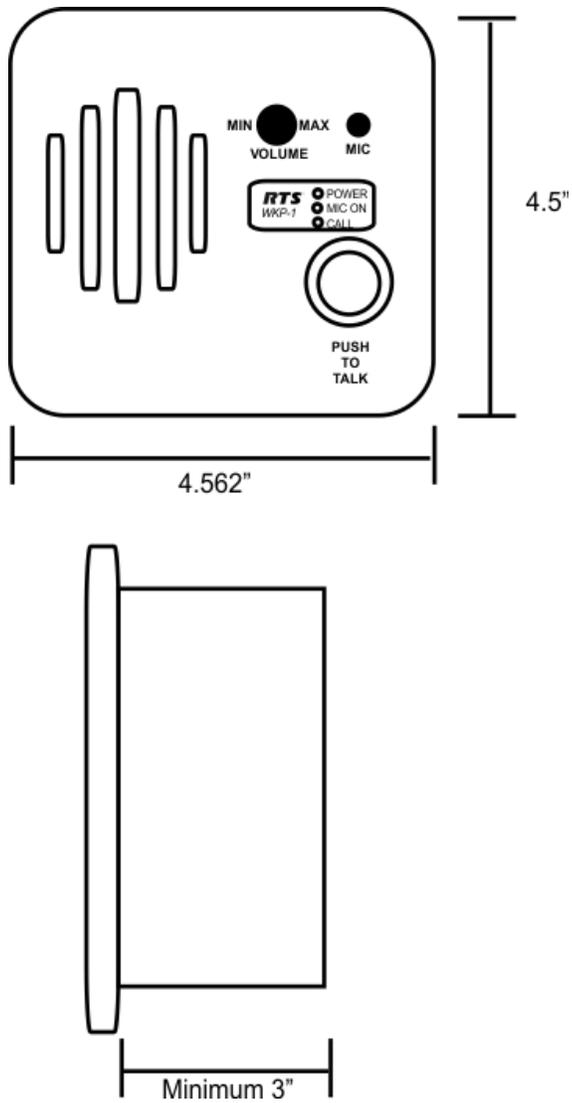
FIGURE 2. WKP-1 Industrial Keypanel size requirements

TABLE 1. Connector Pinouts

Pin	Terminal Strip	RJ-45	RJ-12
1	RS-485+	Audio_IN +	Data-
2	RS-485-	Audio_IN -	Audio from Matrix+
3	NC	GND	Audio to Matrix+
4	Audio_OUT+	RS-485+	Audio to Matrix-
5	Audio_OUT-	RS-485-	Audio from Matrix+
6	NC	Power	Data+
7	Audio_IN+	Audio_OUT+	N/A
8	Audio_IN-	Audio_OUT-	N/A

Installation

Unpacking and Inspection

As soon as possible after receipt, inspect the package and its contents for physical damage that may have occurred in shipping. If damage has occurred, immediately (within 24 hours) contact the carrier involved and file a claim. Save all packing materials and request an immediate inspection by the carrier's insurance claims agent.

The package should contain the following items:

   1 - WKP-1 Industrial Keypanel

   1 - WKP-1 User Manual

Installation and Mounting

The WKP-1 mounts directly into a standard 2-gang electrical box. The electrical box must be at minimum three (3) inches deep to accommodate the stacked design of the PC boards (see Figure 2).

Dip Switches

Dip Switch 1

Open	Latching turned on. (default)
Closed	Latching turned off.
Description	An intercom key can always be turned on for momentary conversation by pressing and holding the key during the conversation. There is also an electronic latching feature that lets you tap intercom keys to turn them on or off. This permits convenient hands-free conversation. However, it can also result in a talk circuit being left on unintentionally. For example, a key that talks to a public address system could be accidentally left on. Or, an IFB key (a type of key assignment often used by a security advisor to give instructions to a user) could accidentally be left on, causing confusion for the listener. The latching feature can be turned off to prevent such accidents.

Dip Switch 2

Open	15-second flash after incoming call is received (default).
Closed	LED flash until caller releases key.
Description	Whenever there is an incoming call and there is a talk key assigned to the caller, the talk LED next to that key flashes. The flash can be set for 45 second time-out, or until the caller's talk key is released.

Dip Switch 3   **Reserved**

Dip Switch 4

Open	The hot mic is disabled (default)
Closed	Audio from the microphone leaves the panel at all times.
Description	When enabled, the audio flows out of the keypanel independent of the talk key position.

Address Switch

A rotary switch is used to indicate the logical port address the keypanel uses to communicate with the Matrix. The switch is read continuously by the Matrix through polling. If the port address is changed, the new address is effective immediately.

NOTE: By default, the address port is shipped with an invalid address to ensure there are no conflicts with existing keypanels. It is important to set the address port for the WKP-1 keypanel for it to function properly

In Zeus, ADAM, ADAM CS and ADAM-M intercom systems, intercom ports are arranged in groups of eight (8). Within each group, each WKP-1 keypanel is uniquely identified by its address switch setting.

FIGURE 3. Address Switch

The address switch has a white pointer that points to the current switch setting. Use the following paragraphs to determine the proper settings.

NOTE: The address switch settings 9 through F, and 0 are not used.

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ADAM Intercom Systems

Each AIO card contains two groups of eight intercom ports. However, the individual intercom ports may be broken out using various types of breakout panels or punch blocks, and group may not be easily identified. It may be easier to set the WKP-1 address switch using the actual intercom port numbers.

REFERENCE: To address the WKP-1, refer to the address table in the ADAM user manual. Locate the intercom port number to which the WKP-1 is connected to. Then, read across to the address column to find the address number. Set the WKP-1 address switch to this number.

NOTE: The address switch settings 9 through F, and 0 are not used.

Gain Control
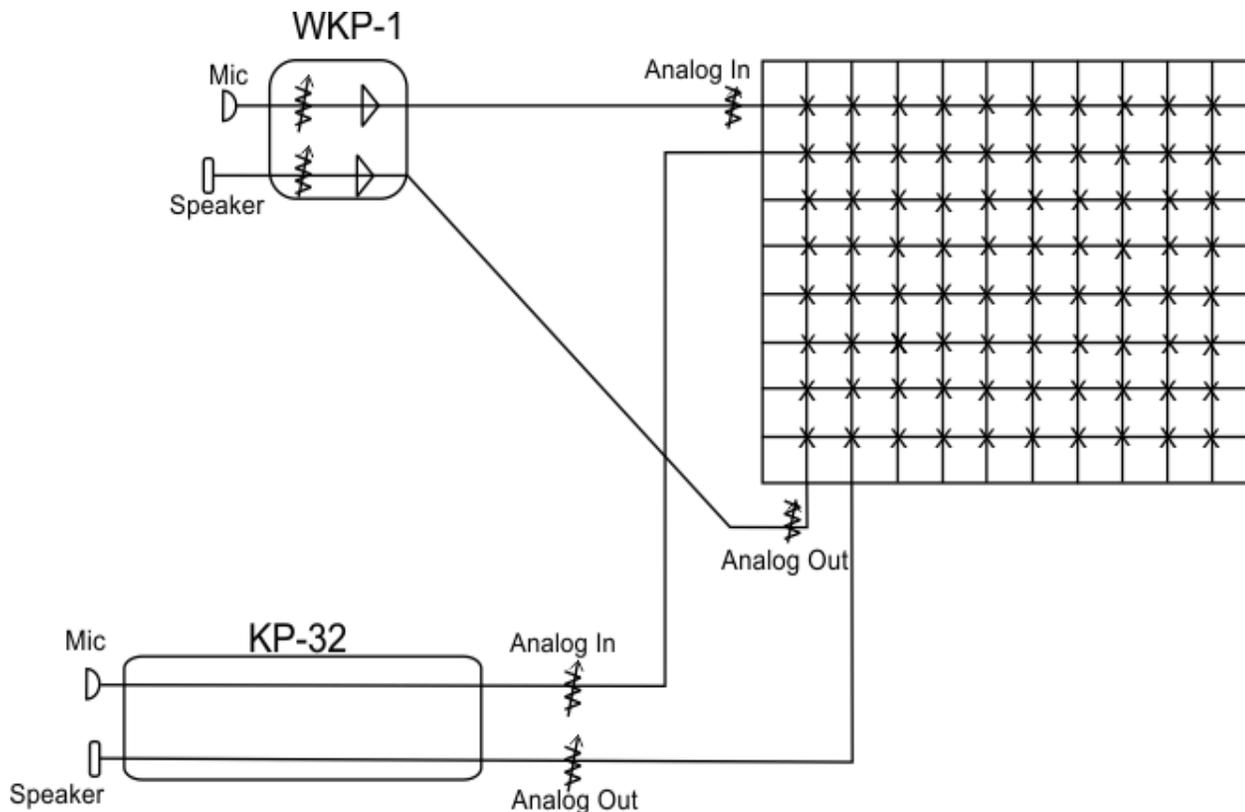
FIGURE 4. System Diagram depicting gain control

The WKP-1 Industrial Keypanel is susceptible to a feedback squeal due to the placement of the mic in relation to the speaker. When this occurs a continuous audio loop forms which creates a feedback or squeal. For example, in Figure 4, audio enters the mic in the WKP-1, goes to the Matrix, then out the speaker on the KP-32. If the mic on the KP-32 is on, the sound emitting from the speaker may be picked up by the mic and sent back to the Matrix and to the WKP-4, thus creating an audio loop. However, if at some point within that loop a break occurs, due to the half-duplex mode or gain control settings, the loop cannot complete and the feedback is not heard.

There are several ways to reduce audio feedback:

- Change Gain Settings with the Application Setup
- Run in Half-Duplex Mode
- Talk Latch Disabled

Change Gain Settings with the Application Setup

There are several different points within the system setup where the user can set the gain control so as to limit the mic or speaker sensitivity to reduce the occurrence of feedback. The gain control can be modified in the WKP-1, in the Matrix on the crosspoints (using AZedit), or in the keypanel on the other side of the Matrix. For example, if the purpose of the industrial keypanel is to overhear work being done in a warehouse, which may or may not be close to the speaker, the sensitivity of the speaker must be set to pick up audio from a distance. And, since the main use of the keypanel is listen, the mic gain control is set low so as to not allow the speaker to pick up any audio.

Run in Half-Duplex Mode

Half-Duplex Mode allows the transmission of audio data in just one (1) direction at a time, whereas full-duplex mode allows transmission in both directions at the same time. Because the WKP-1 does not support half-duplex mode, the half-duplex mode must be setup on the keypanel at the other end of the transmission. Setting the keypanel in half-duplex mode forces a break in the audio feedback loop. In half-duplex mode the user can either listen or talk, but cannot do both at the same time.

These configurations are done in AZedit. Auto-reciprocal allows listen to be on all the time and allows talk to be turned on and off. This reduces feedback because talk is only on when the talk button is pressed, thereby not allowing audio through. Auto-mute is also a way to reduce feedback through the system. When auto-mute is utilized, listen automatically turns off when the talk button is pressed.

Talk Latch Disabled

Talk Latch Disable is another way in which the audio feedback can be reduced. Talk Latch allows the user to push a keypanel button once and talk is turned on. When Talk Latch is disabled, the talk function only works when the button is pressed. The user can disable the talk latch button through AZedit or set dip switch 1 to close in the WKP-1 dip switch settings (see "Dip Switches" on page 12).
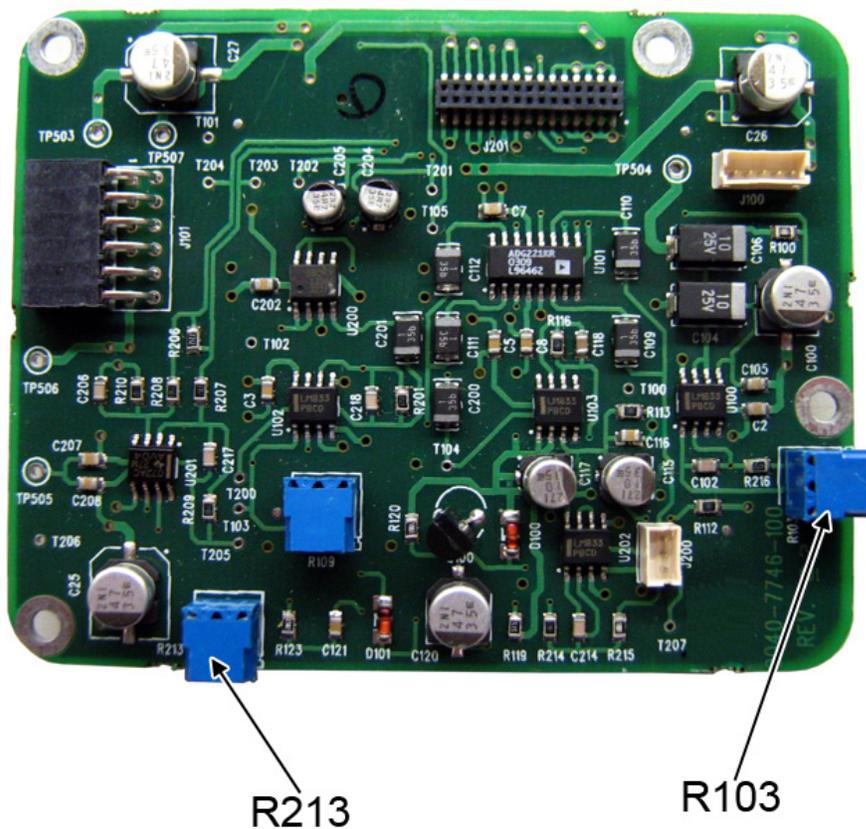

FIGURE 5. The middle board in the WKP-1 (also referred to as the audio board).

There are three (3) gain control pots that can be configured to reduce feedback. Turning the gain control clockwise increases the gain level; turning it counter-clockwise decreases the gain level.

- R213 controls the gain for the speaker
- R103 controls the gain for the mic

The Three (3) WKP-1 Boards
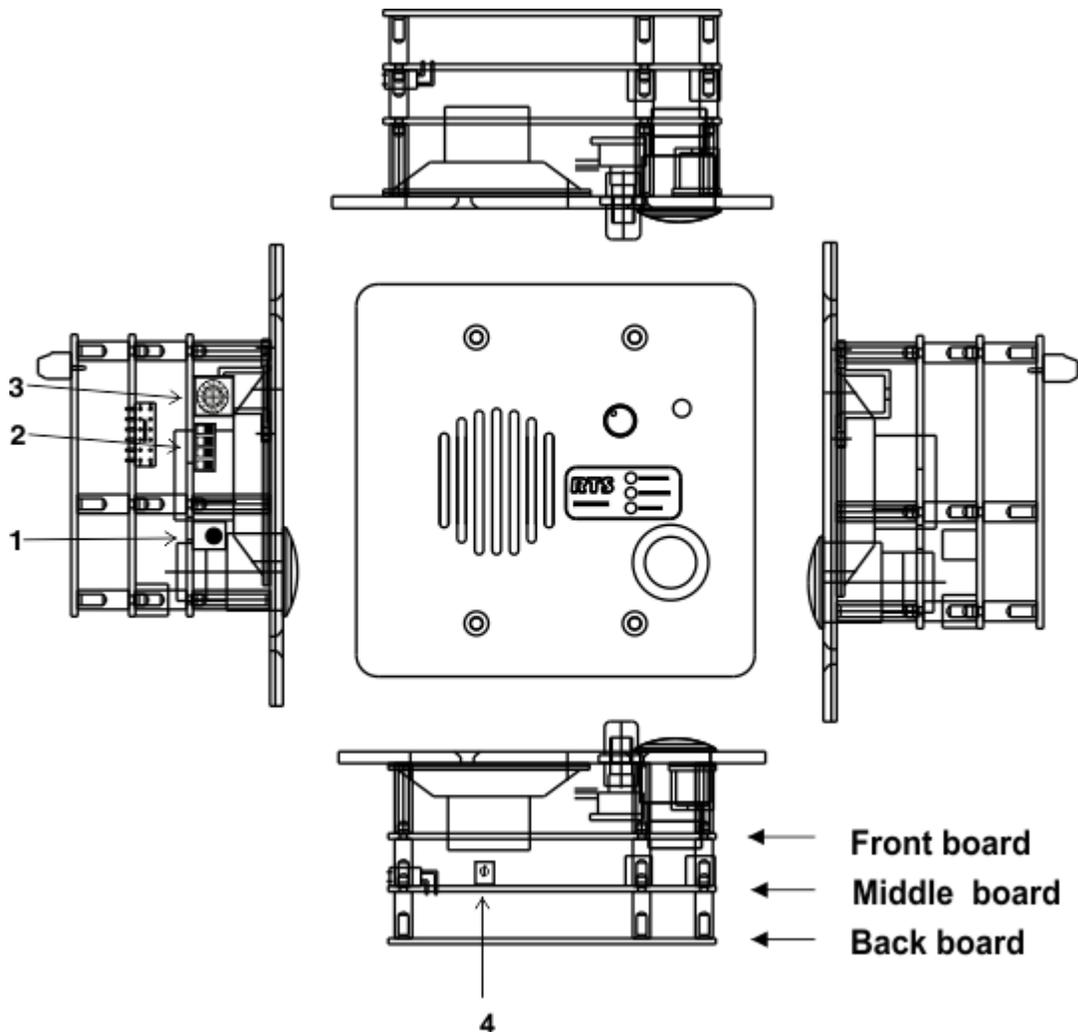
FIGURE 6. WKP-1 3-dimensional view of boards.

Contents

Front Board

1. Reset Button -	The reset button provides a hardware reset to the processor.	
2. Dip Switches -	Set the dip switches to individual preferences (see "Dip Switches" on page 12).	
3. Rotary Address Switch -	The rotary address switch assigns a port address in which to communicate with the Matrix (see "Address Switch" on page 13).	

Middle Board

4. 4-Internal Volume Setting Pot (213) -	The internal volume pot is located on the middle board. It controls the lower limit of the audio to the speaker.

Back Board

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Connections -	RJ-12, CAT-5 and local power (see Figure 5 on page 15).

Connections
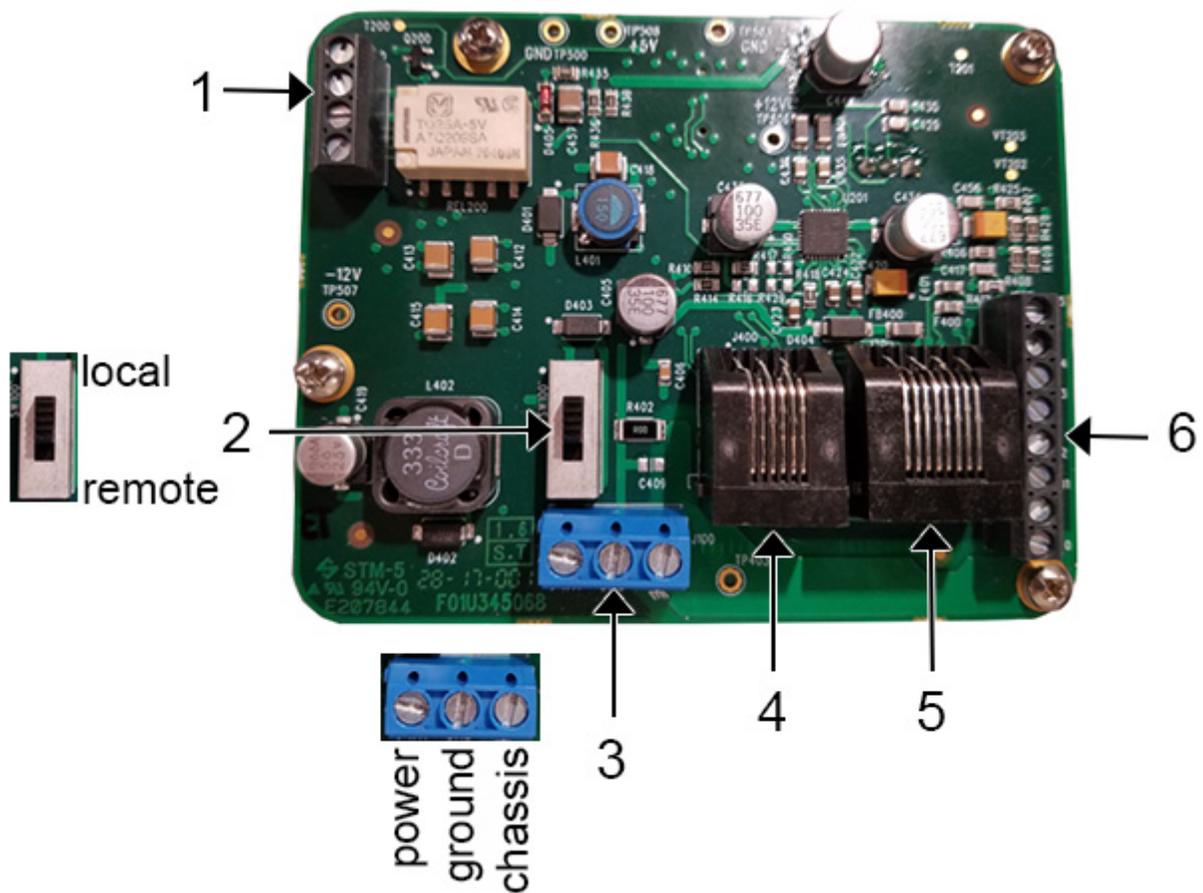
**FIGURE 7.** Connections Board of the WKP-1.

NOTE: The numbered descriptions correlate with the numbers in the Figure 7.

1. GPI Relay Contact 4-pin Terminal (J500)
2. Local or Remote Power Switch (SW100)
3. Local Power 3-pin Terminal (J100)
4. RJ-45/CAT-5 Connection (J300)
5. RJ-12 Connection (J400)
6. 8-pin Terminal (J200)

NOTE: If you are providing your WKP-1 keypanel with remote power, use the WKP-1 BOP (see Figure 10 on page 25).
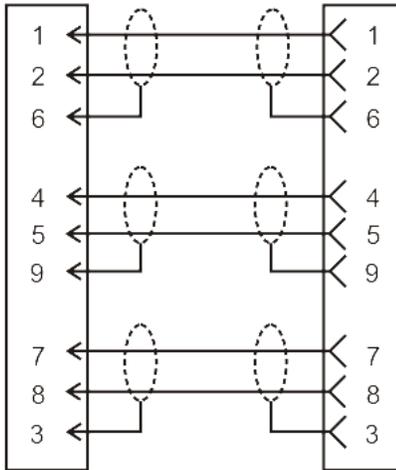
FIGURE 8. DE-9P Male to DE-9S Female
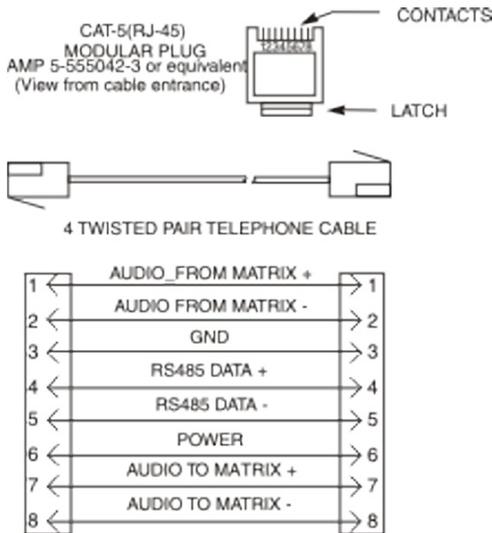
FIGURE 9. CAT-5 (RJ-45 Intercom Cable Wiring Diagram

TABLE 2. GPI Relay Terminal Pin Assignments

Pin	Channel
1	NO
2	C
3	NO
4	C

NOTE: By default the channels are always open.

Keypanel Setup

You can only make keypanel assignments using AZedit.

REFERENCE: For more information on AZedit, see the AZedit user manual.

Intercom Key Operation

Volume Adjustment

Adjust speaker volume with the volume control.

Momentary vs. Latching Operation

For **momentary key activation**, do the following:

> Press and hold the **intercom key**.

For **latching operation**, do the following:

1. Tap the **intercom key** to turn it on.
2. Tap the **intercom key** again to turn it off.

> NOTE: If the LED next to a key does not turn on when the key is activated, this means the key is not currently assigned. The electronic latching feature (dip switch 1) must be enabled in order to use latching. See "Dip Switches" on page 12.

Intercom Key Operation for Different Key Assignments

Talk or Listen Key Operation

The PUSH-TO-TALK button activates talk (if assigned). Listen cannot be activated from the WKP-1. The user can only listen when a different keypanel is talking to it.

Special Functions

Talk+Auto-Follow (AF) Listen Key Assignment

This key assignment works the same as the basic talk/listen key assignment. The PUSH-TO-TALK button activates talk. Talk may be turned on or off independently by pressing and or releasing this button.

Talk+Auto-Listen (AL) Listen Key Assignment

The push-to-talk button activates both talk and listen. However, only the talk LED turns on, you cannot turn off listen. If talk is off, you can turn listen on independently by pressing up.

Talk+Auto-Reciprocal (AR) Listen Key Assignment

The PUSH-TO-TALK button activates talk. Listen is always on and continuously monitors whatever is assigned to the talk position.

Intercom Key Indications

Mic On Indicator

Solid Green Indicator -	Talk is active.
Continuous Red In-Use Indicator -	An in-use indicator is provided for an IFB key. It is also provided for a key that talks to a remote intercom system (when your intercom system is equipped with optional trunking). The in-use indicator warns you that someone else is currently talking.
Red Flashing Busy Indicator -	May occur when the talk key is activated to talk to an IFB or a remote intercom system. This indicates that some other keypanel with a higher priority is currently talking and you cannot talk at this time. Once calls have been answered, the green LED next to the call waiting key turns off.

Incoming Calls

Green Flashing LED Indicator -   This means another user on the intercom system is calling. Press the PUSH-TO-TALK button to answer the incoming call.

The mic on or call LED indicator flashes to indicate an incoming call to the keypanel.

- If tally is disabled, the LED indicator is only enabled for 45 seconds before it stops and returns to normal operating mode.
- If tally is enabled, the LED indicator is enabled as long as the push-to-talk button is not pressed.

When a call comes to the keypanel, the incoming call LED indicator is activated and flashes. At this point, if the PUSH-TO-TALK button is pressed, it acts as a **CWW** (Call Waiting Window) reply key. The user can respond to the incoming call rather than only being able to talk to the preassigned talk key.

There is a 45 second time-out to reply to the incoming caller. Once the 45 second time-out has elapsed and the PUSH-TO-TALK button is no longer pressed, the panel returns to normal operation.

NOTE: The 45-second time-out does not mean that after 45 seconds the user cannot continue talking with the incoming caller if the PUSH-TO-TALK button is still pressed. It means that after 45 seconds, if either the incoming caller or the WKP-1 disconnects normal talk key assignments are restored.
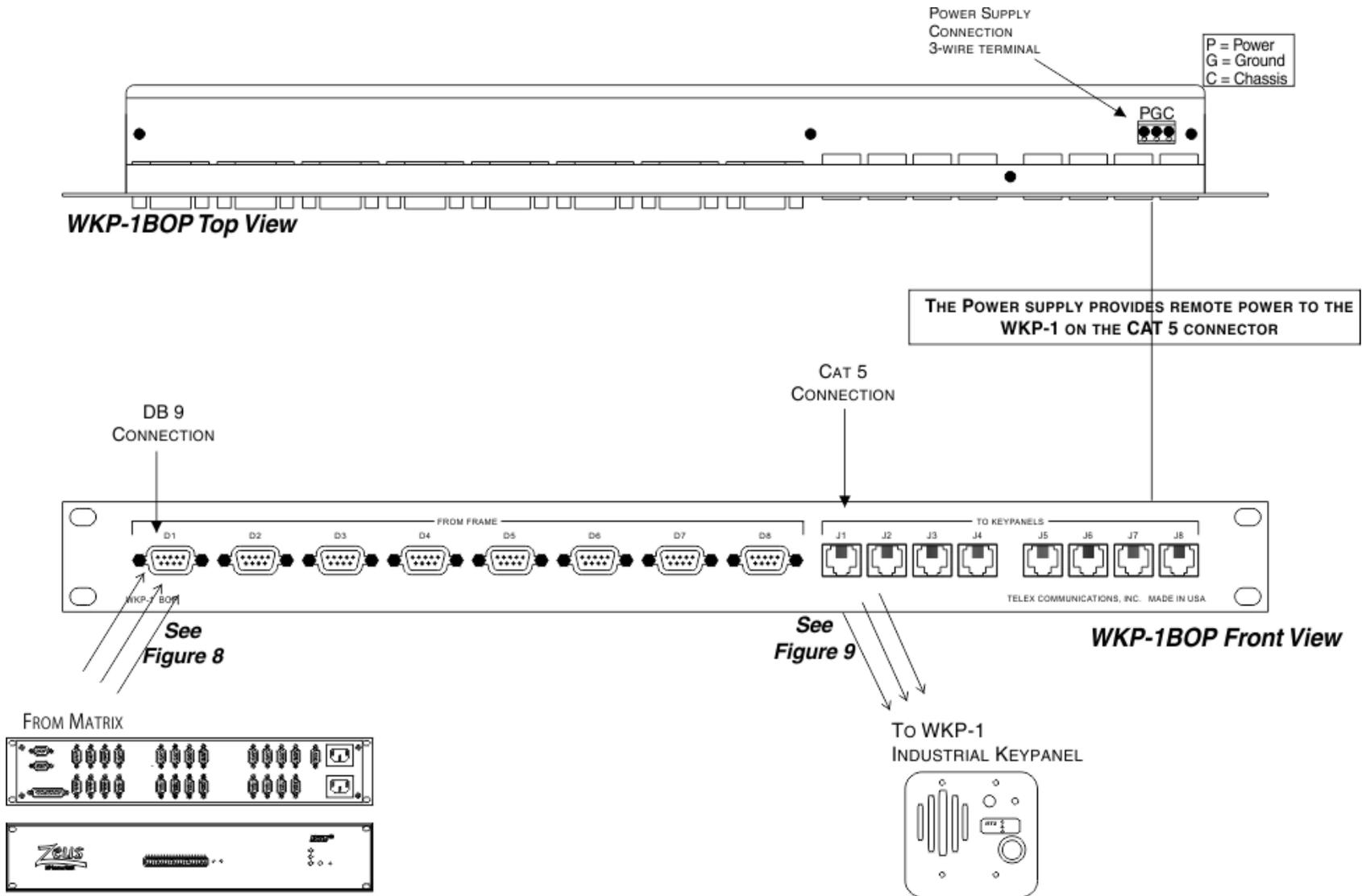
FIGURE 10. WKP-1 BOP System Diagram