# Radionics™

## D169
## 2-Way Voice Verification Module

## Installation and Operating Manual

## Notice

The material and instructions covered in this manual have been carefully checked for accuracy and are presumed to be reliable. However, Radionics, Inc. assumes no responsibility for inaccuracies and reserves the right to modify and revise this manual without notice.

If a discrepancy is found in this documentation, please mail a photocopy of the corrected material to:

> Technical Communications
> c/o Radionics, Inc.
> 1800 Abbott Street
> P.O. Box 80012
> Salinas, CA 93912-0012

## FCC Notices

1.  This equipment complies with part 68 of the FCC rules. On the rear of this equipment is a label that contains, among other information, the FCC registration number and the ringer equivalence number (REN) for this equipment. If requested, this information must be provided to the telephone company.
2.  The REN is used to determine the quantity of devices which may be connected to the telephone line. Excessive REN's on the telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of the RENs should not exceed 5.0. To be certain of the number of devices that can be connected to the line, as determined by the total RENs, contact the telephone company.
3.  This equipment is designed to use a USOC type RJ-31X jack for connection to the telephone line.
4.  If the D169 causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.
5.  The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make the necessary modifications in order to maintain uninterrupted service.
6.  If trouble is experienced with the D169 equipment, please contact Radionics for repair information. If the trouble is causing harm to the telephone network, the telephone company may request you remove the equipment from the network until the problem is resolved.
7.  The D169 equipment must be repaired at the Radionics factory.
8.  The D169 can not be used on public coin service provided by the telephone company. Connection to party line service is subject to state tariffs (contact the state public utility commission, public service commission, or corporation commission for information).
9.  This equipment is hearing aide compatible.

***Warning:  This equipment generates and uses radio frequency energy. If not installed and used in accordance with the instruction manual, it can cause interference to radio communications. The rules with which it must comply afford reasonable protection against interference when used in most locations. However, there can be no guarantee that such interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures.***

- ***Reorient or relocate the receiving antenna.***
- ***Increase the separation between the equipment and receiver.***
- ***Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.***
- ***Consult the dealer or an experienced radio/TV technician for help.***

Complies with Part 68, FCC rules
FCC Registration Number:  4E2USA-21463-KX-N
Ringer Equivalence:  0.2

This device has been verified to comply with FCC Rules, Part 15. Operation is subject to the two following conditions:  1) this device must not cause radio interference, and 2) this device must accept any interference received including interference that may cause undesired operation.

## Description

The D169 Voice Verification Module is a two-way audio system that allows for bi-directional, hands-free speech between the premises and the monitoring service operator.

The D169 control board mounts in the control panel's enclosure. A six-wire cable connects the D169 to the control panel.

The D169 has been manufactured to work in conjunction with the Radionics 2000 series two-way control panels; however, it will operate with most other panels.

## Specifications

**Operating Voltage:**
11.0 to 15.0 VDC (the control panel continues operation to 10.2 VDC)

**Standby Current:**
8.0 mA

**Audio Mode Current:**
180 mA

**Siren Mode Current:**
270 mA with one speaker
540 mA with two speakers

**RSM-12 Speaker/Microphone:**
8 ohm, 15 watt

The following is included with the purchase of a D169:

1. D169 Control Board
2. RSM-12 Remote Speaker/Microphone
3. 8-Conductor , Dual Modular Telephone Cable
4. 6-Conductor, D169 to Control Panel Cable
5. Mounting Screws for Speaker/Microphone
6. Plastic Mounting Anchors for Speaker/Mic
7. Adhesive Board Mounts for D169 Board
8. Case Screw

Additional speakers and microphones can be added to the system, but must be ordered separately. Several models of microphones are available.
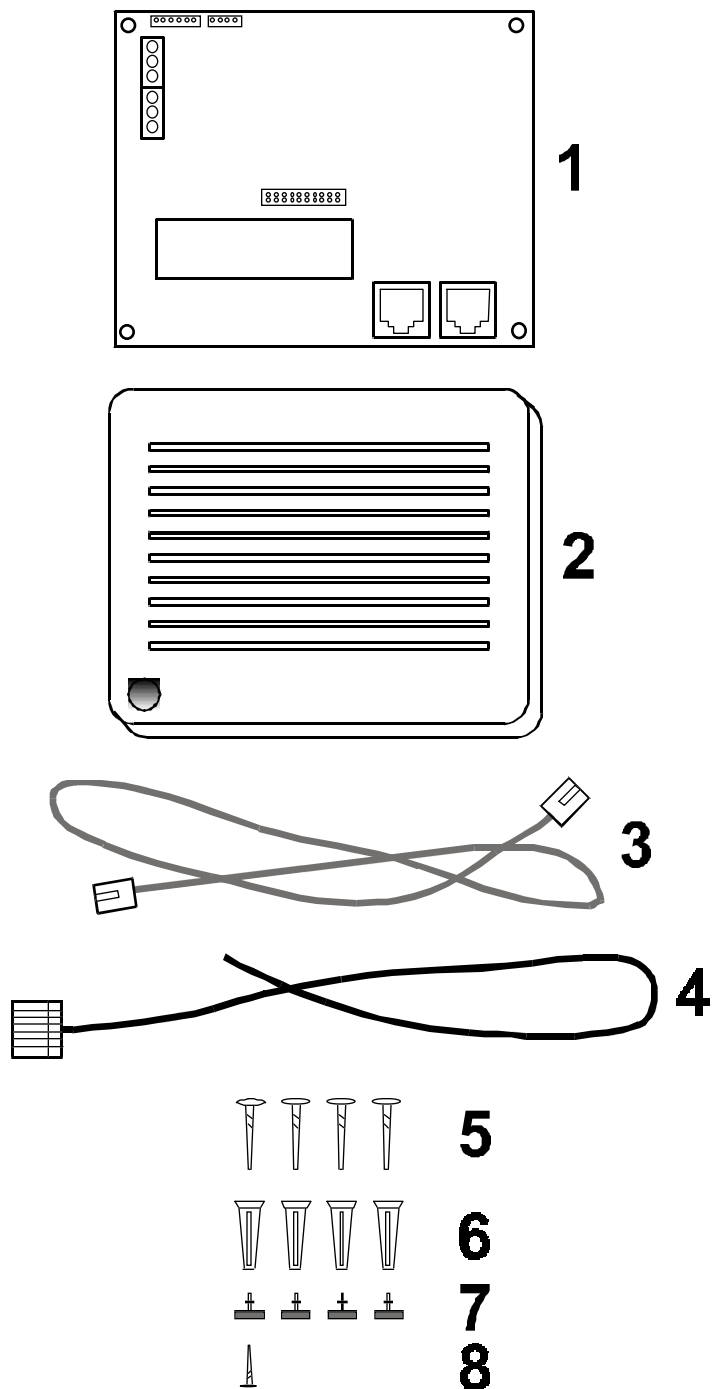


**Figure 1:  Components of a D169**

## Installation Overview

The <u>basic</u> D169 installation consists of the following:

1. selecting options on the three jumper strips (factory preset for a Radionics 2000 series control panel)
2. the four wiring steps as shown in Figure 2 (complete wiring information begins on page 7)
3. mounting the speaker/mic and D169 board
4. testing the system

Most of the wiring can be accomplished with cables that plug in, however, some wires will need to be stripped. Therefore, a small screwdriver and wire strippers are the only tools required for wiring.

A drill and a larger screw driver will be required to mount the speaker/microphone.

## Select Operating Options

The D169 is programmed using jumpers. The default jumper locations have been set for use with a Radionics 2000 series control panel.

If you need to change the default settings, it will be easier to change them before the D169 board is mounted in the enclosure.

Setting the operating options requires some knowledge of the preferred practices of the monitoring facility as well as certain aspects of the control panel (such as the polarity of its siren/bell output). If this information is not readily known or available, it may be necessary to perform tests with a voltmeter.
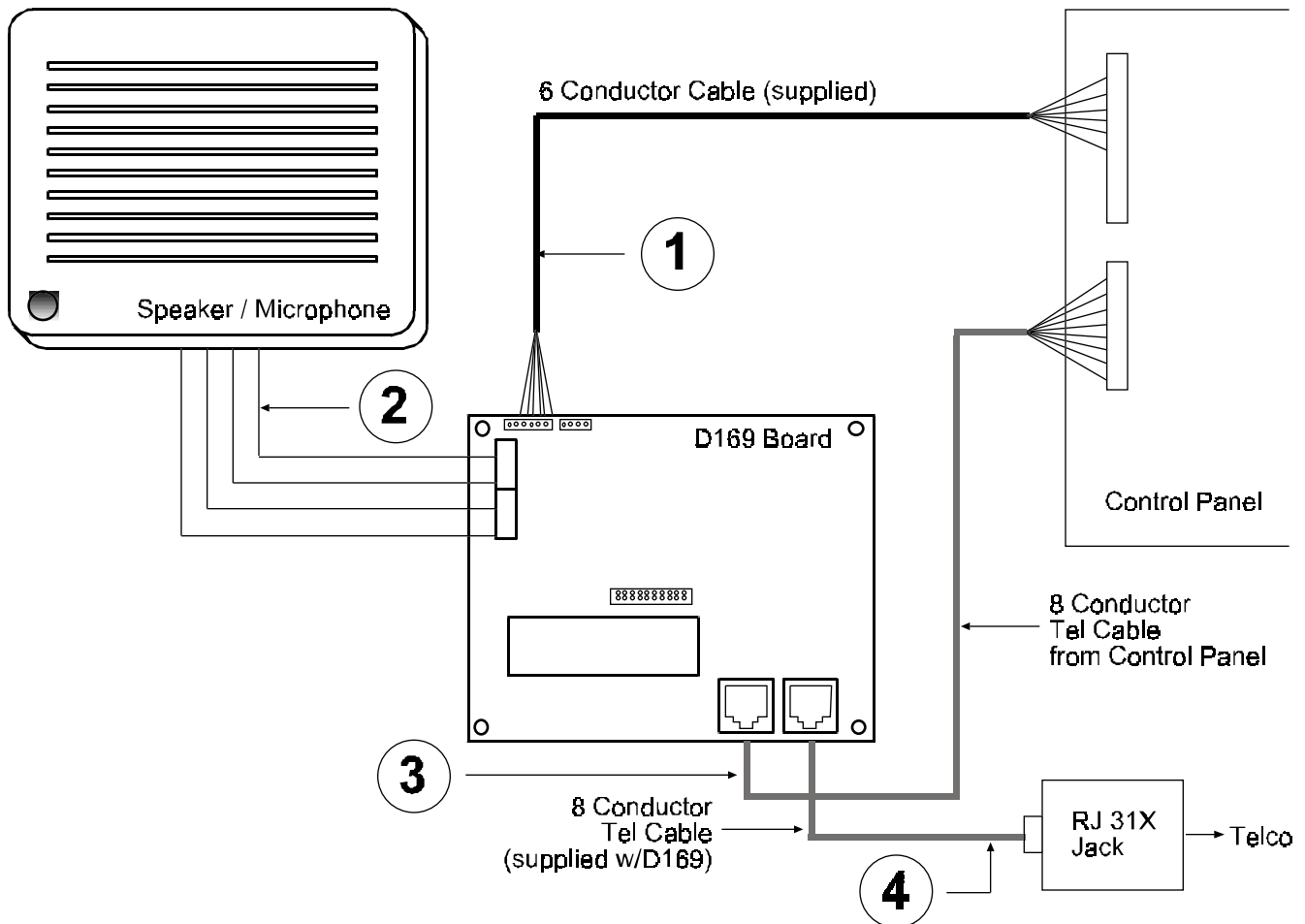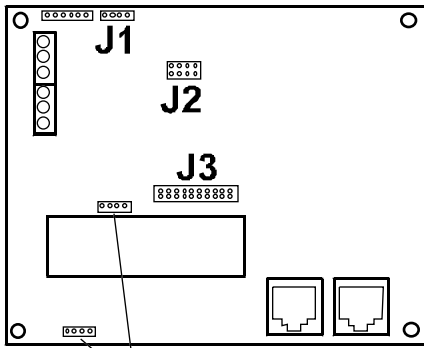
**Figure 2: The four wiring steps**

## D169 Jumper Defaults

The following Figure shows the location of the jumpers on the D169 board.



These pins are for expansion modules

**Figure 3: Jumper locations**

The following Figure shows the default settings for each jumper (set for a Radionics 2000 series control panel.



**J1 Jumper Default**

1 2 3 4

2 and 3 selects
V+ Siren Driver

**J2 Jumper Default**

1 2 3

4 5 6

1 and 2 are always jumped

5 and 6 selects
- Siren Activation

**J3 Jumper Default**
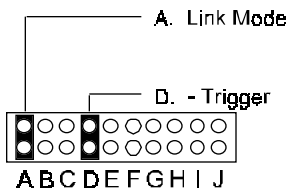
A. Link Mode

D. - Trigger

A B C D E F G H I J

**Figure 4: Default settings**

## J1 Jumper Settings
## Siren Function Enable

The D169 board includes a built-in siren driver that allows the speakers to act as sirens. The default setting makes all speakers connected to the D169 board act as sirens when a verification session is not in progress.

|  | J1 Jumper Positions | Description |
|---|---|---|
|  | 1 and 2 | Speakers connected to the D169 board do not function as sirens. |
| Default | **2 and 3** | Speakers connected to the D169 board function as sirens. |
|  | 3 and 4 | Not used. |

## J2 Jumper Settings
## Siren Function Trigger Polarity

If you are not using the speakers as sirens, this section may be skipped.

If you are using the speakers as sirens, use jumper J2 to tell the D169 board how the control panel's alarm output will trigger the siren function. The default setting is for an alarm output voltage that drops on activation.

If it is unknown whether the alarm output voltage goes up or down after activation, connect a voltmeter [+] lead to the siren terminal with the [-] lead connected to [-] or ground. Observe the reading and then trip the siren.

|  | J2 Jumper Positions | Description |
|---|---|---|
|  | 1 and 2 | Always jumped. Do not remove jumper. |
|  | 3 and 4 | Not used. |
|  | 4 and 5 | Alarm output voltage goes up on activation (2.5 volts or more). |
| Default | **5 and 6** | Alarm output voltage goes down on activation (1.5 volts or less). |

## J3 Jumper Settings
## Link, Callback Mode, and Siren Qualifier

Use jumper J3 to set the D169 board for Link or Callback mode, to enable the Siren Qualifier, and to select the Voice Verification Session Trigger.

If you are using a Radionics 2000 series control panel, the J3 Jumper defaults are properly set for optimum coordination. The defaults (fully described in the table to the right) have the control panel trigger the 2-way session, with the Siren Qualifier disabled.

If the defaults need to be changed, review the settings below, otherwise you can skip to the **Programming the 2000 series Panel** section.

### *Link Mode:*
Most monitoring stations prefer to operate in the Link mode where a 2-way session is automatically activated immediately following an alarm transmission on the same phone call. This mode requires that the monitoring facility has a procedure to capture the call immediately after the alarm transmission and route it to the proper operator. In this mode, the premises siren will continue to sound until the operator commences the 2-way session with a touch tone command.

### *Callback Mode:*
Unlike Link mode, this mode does not depend on the monitoring facility's ability to "catch" the 2-way session before the phone connection is lost. In this mode, the D169 goes directly into a 2-way session. When the monitoring facility calls back, the D169 answers with a prompt tone permitting the operator to engage in the 2-way session with touch tone commands.

### *Auto-Sense or Built-in Audio Triggers:*
Some control panels have a listen-in trigger terminal that tells an external device precisely when and whether or not to engage a 2-way session. When available, this option should generally be used since it may screen unwanted 2-way sessions better than the Siren Qualifier method discussed below.

Using this feature requires that the options be set to tell the D169 the polarity of the trigger signal.

### *Qualifier Option:*
Sometimes it is desirable, particularly when operating in the Link mode, to prevent the D169 from trying to initiate a 2-way session in order to minimize monitoring traffic and inconvenience to the subscriber.

Typically this would be where transmissions of a non-emergency nature occur (such as supervisory or trouble reports which do not activate the siren).

The Qualifier option only initiates 2-way sessions after alarm transmissions if the siren is still ON or has been ON within the last 15 minutes and operates in Auto-Sense mode.

Alternately, the six conductor cable's brown wire may be used to bypass the Qualifier option in the case of silent panic or holdup alarms. To ensure that a 2-way session will be initiated on a silent event, it is required that a momentary [+] input to the brown wire is provided when a silent panic button is activated.

|  | J3 Jumper Positions | Description |
|---|---|---|
| Default | A on | Link mode enabled. The control panel's transmission of alarm reports and the 2-way voice verification session are linked in the same phone call.<br><br>The control panel triggers the D169 to begin a voice verification session immediately after it finishes transmitting its reports. |
|  | A off | Callback mode enabled. The D169 begins a three minute phone answer period when the control panel ends its alarm report transmission.<br><br>The D169 answers on the first ring with a prompt tone during the phone answer period. The operator at the monitoring facility can use DTMF commands to begin a voice verification session. |
|  | B on | Siren Qualifier enabled. The D169 will begin a voice verification session <u>only</u> when the alarm output (siren) is activated, or has been activated in the last 15 minutes. |
| Default | B off | Siren Qualifier disabled. |
|  | C on (D off) | The voltage on the control panel trigger for voice verification session goes up on activation (2.5 volts or more). |
| Default | D on (C off) | The voltage on the control panel trigger for voice verification session goes down on activation (1.5 volts or less). |
|  | C <u>and</u> D off | Auto-Sense trigger enabled. The D169 will automatically sense when the control panel finishes transmitting reports to the monitoring facility. |
|  | E to J | Not used. |

## Programming the 2000 series Panel

The D2000 series control panels must have some of their programming parameters set in conjunction with the D169. These include the following (see the table below and the descriptions to follow):

| Settings | | | |
|---|---|---|---|
| POINT CODES | Digit 2 | 2, 3, 7, 8 | Allows these points to trip the D169. |
| REPORTS | Delay Alarm Report | 255 | This setting, combined with the above settings, allows the system to transmit an alarm report to begin a voice session. |

- **REPORTS Group:  3.4**: When the Delay Alarm Report prompt is set to 255 <u>and</u> a point programmed for Report Delay creates an alarm event, the system will transmit an alarm report.

  When the report is "ack"ed, the system activates the Voice Request relay function and starts a 30 second Report Delay timer.

  The D169 picks up the phone line on the Voice Request relay output. If the D169 hears the DTMF tone for Key 2, it begins a two-way session by first shorting the Voice Active Point on the control panel.

- **Buzz on fault Point**: When the Delay Alarm Report prompt is set to 255, the Buzz on Fault point type works differently for **on-board** points.

  If the Delay Alarm Report prompt equals 255, and digit 1 of the Point Code equals 3, and the D169 shorts the point, then:

  - the panel resets the Report Delay timer to 30 seconds
  - if the Fire Bell is not active, the panel sets Bell Time to zero effectively silencing non-fire alarm output
  - if the Fire Bell is active, only a code from a user or bell timeout will silence the alarm output

  Removing the short from a Voice Active Buzz on Fault point:

  - resets the Bell Time
  - resets the Report Delay timer to 30 seconds

- **Voice Request Relay Function**: The Voice Request relay function replaces the RF Special Key function. The Voice Request relay function (24) activates for two seconds when the acknowledgment of the alarm report sent described above is received at the panel.

- **CAUTION:  Duress Reports and A, B, C Keys**: The panel will attempt to transmit a Duress alarm or reports from A, B, C keys during a two-way session. This is the only time the panel will attempt to interrupt a two-way session. The panel will go into communication fail if the two-way session does not end before the maximum dialing attempts is reached.

  It is recommended to NOT use the Duress feature or the A, B, C key reporting feature with the D169.

## Wiring the Basic Installation

### General

Plan the mounting locations of the D169 board and the Speaker/Microphone.

***Important:  Be sure power to the control panel is off and the battery is disconnected.***

### Six Conductor Cable
### to Control Panel (supplied)

***Warning: Plugging in the connector incorrectly to the D169 board will damage the D169 board. Be certain that the brown wire is on the left side of the connector and the black wire is on the right side before plugging the connector into the D169 board. See Figure 5 below.***
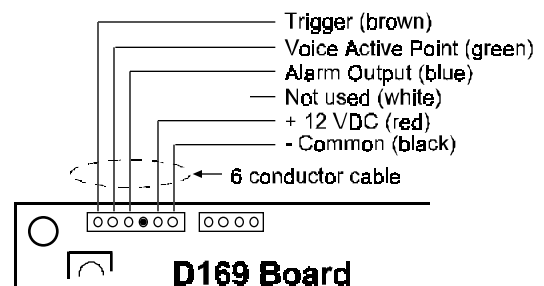


**Figure 5:  Six conductor cable**

1. Cut and strip the six conductor cable to the length required to run it from the D169 board to the control panel.

2. Connect the black wire to the control panel's common and the red wire to +12VDC.

3. Connect the blue wire to the control panel's [+] or [-] Bell or Alarm output. This connection will activate the D169's built-in siren or, depending on the options selected.

4. Connect the green wire to the "Voice Verification Active" point (Digit 1 of POINT CODE = 3). It must be a supervised point.

5. If an audio trigger terminal is available (for the Radionics 2000 series control panels, this is the Ext 1 or Ext 2 terminals), it must be programmed for "Voice Request" which is Relay Function 24). Connect the brown wire to it. Alternatively, the brown wire may be used to override the Siren Qualifier option with silent panic buttons (see the Silent Qualifier option).

For the Radionics 2000 series control panels, the following table shows the recommended wiring:

| 6 Cond Cable | Terminate on Panel | Function | Description |
|---|---|---|---|
| Brown | Ext 1 or 2 | 2-way session trigger | Momentary 12V trigger from panel to begin 2-way session. The control panel will wait the interval programmed in the Alarm Delay prompt and then seize the phone line. |
| Green | Any Voice Active Point | 2-way session is active | Shorts a Voice Active point when the 2-way session is active. |
| White | | | Not used. |
| Blue | Alarm [-] | Siren Trigger | Allows the speakers to act as sirens. |
| Red | Aux [+] | +12VDC | The D169 draws 8mA when idle, 180mA when in audio mode, and 270mA when sounding the speaker as a siren (540mA for two speakers). |
| Black | Common | Common | Do not connect to earth ground. |

## Four Conductor Cable
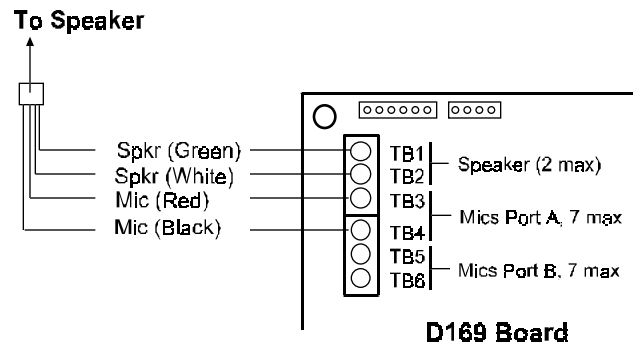## Speaker/Microphone to D169 Board



**Figure 6: Four conductor cable**

1. Connect the four wires to the D169 board's terminal as follows:

   • Green to TB1
   • White to TB2
   • Red to TB3
   • Black to TB4

## Six or 8 Conductor Telco Cord
## to Control/Communicator

1. Connect the spade terminals of the Telco cord to the control panel just as you would when installing it without the D169.

   • Grey to R1
   • Red to R
   • Green to T
   • Brown to T1

## Eight Conductor Modular Telco Cord
## (supplied)

1. Plug the cord into the phone jack on the D169 board, then into the Telco RJ-31X jack.

2. Wire the RJ-31X jack as shown in Figure 7 on the following page.
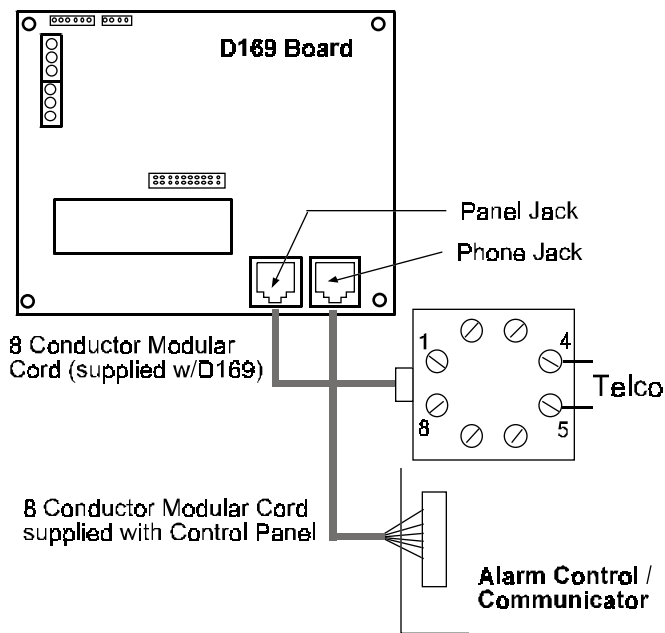
**Figure 7: Telco cord**

## Mounting

### The D169 Board

The D169 board mounts in the control panel's enclosure. Use the four plastic adhesive board mounts.

• Snap them into the four mounting holes at each corner of the D169 board.

• Peel off the protected paper and "stick" the board to a clean surface inside the enclosure.

If the board ever needs to be removed, pinch the tabs on the plastic board mounts to release the board. This preserves the adhesive material of the plastic mounts.

### The Speaker/Microphone

The Speaker/Microphone can be mounted to any wall or smooth surface using the screws provided and, if necessary, the wall anchors.

• Mount the base of the Speaker/Mic to a wall or other surface. Use the four screws (and anchors).

• Snap the cover onto the base and secure with the remaining bottom screw.

If the cover ever needs to be removed, always pry it off from the right.

## Adding Additional Microphones and Speakers

The D169 can support two 8 ohm, 15W speakers connected in parallel on its single speaker output circuit. More speakers can be added provided they are connected in a series/parallel arrangement so that their impedance does not go below 4 ohms.

The D169 can also support up to seven microphones on each of its two microphone ports which can be central station selected. Microphone connections to the ports are not polarity sensitive and do not require shielded cable. They can support wire runs up to 300 feet.

### Remote Speaker Microphones (part number RSM-12)

Radionics supplies an additional Remote Speaker/Microphone as a separate part number (the RSM-12). It is identical to the speaker/microphone supplied with the D169.

Because the D169's siren output is limited to an ohm threshold, only one additional RSM may be installed per system.

The second RSM's green and white wires are wired in parallel with the other speaker/microphone to the D169 board's TB1 and TB2 terminals.

The red and black wires may be connected to either Mics port A: TB3 and TB4, or to Mics port B: TB5 and TB6. See Figure 8 below.
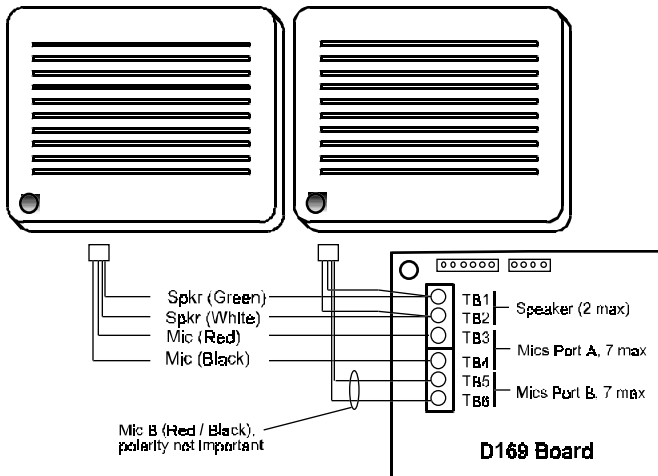


**Figure 8: Connecting an additional RSM-12**

## Remote Microphones

Radionics also supplies several models of remote microphones that can be mixed and matched. Up to seven microphones (including the RSMs) may be used per port.

The microphones must be wired in parallel, the wire run must be limited to 300 feet, and polarity is not required.
Although seven microphones can be accommodated on each port electrically, consideration should be given to the cumulative buildup of background noise and reduced sensitivity that occurs when placing multiple microphones on the same port.

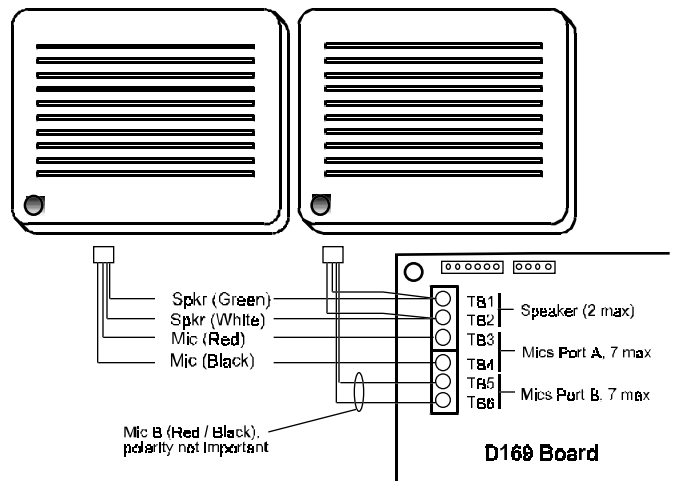For the wiring diagram, see Figure 9 below at the top of the next column.



**Figure 9: Additional remote microphones**

## Remote Microphone Jacks

The Remote Microphone Jack (part number RMJ-12) is a remote microphone built into a flush mount, fully functional phone jack.

It makes use of the unused imbedded telephone wiring that may be available in some premises. It will allow you to expand microphone coverage without pulling new wiring.

This is possible because the D169's phone jack, in addition to carrying phone signals, will connect the "spare pair," (yellow and black) to Mics port A.

Therefore, if terminals 3 and 6 on the RJ-31X jack (yellow and black) are connected to the house wiring yellow and black, both telephone and microphone connections should be available at any phone jack location. By simply replacing existing phone jacks with RMJ-12 jacks, microphone coverage can easily be expanded.

See Figure 10 the top of the next column.

*Caution:* *There is a growing trend, particularly in residential environments, to expand phone service beyond one line (fax machines, modems, ISDN, VOD, etc.). First determine if the "spare pair" is, in fact, unused, then be sure to consider future conflicts before deciding to use one or more imbedded "spare pairs."*
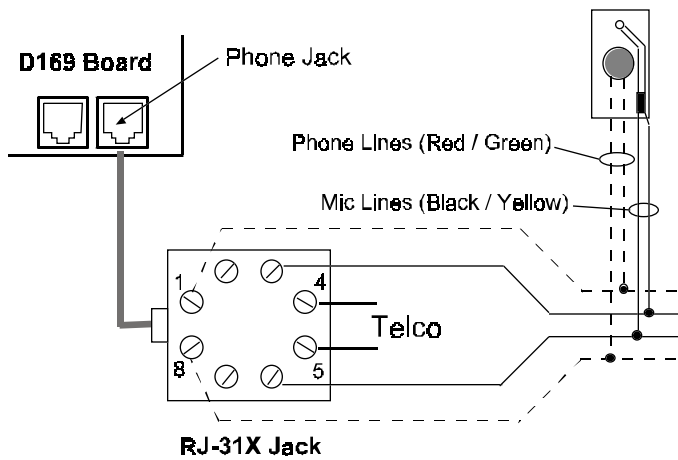
**Figure 10: Remote microphone/jack wiring**

## Premises Testing

The coverage of the microphones and speakers can be tested without involving the monitoring facility by using a sound source such as a portable radio or preferably, an associate.

1.  With the enclosure door open, apply power to the control panel. Nothing should smoke or create odor.

2.  Test the control panel's arm/disarm functions for normal operation.

3.  Determine the most convenient way to dial the premises phone number and have it picked up. When a phone is picked up, the phones will remain in an "off hook" condition.

4.  With "A" and either "C" or "D" of Jumper J3 selected, momentarily apply 12 volts to the brown wire of the six conductor cable. This will cause the D169 to initiate a 2-way session for 90 seconds (the LED will turn ON and beeping will occur on the phone line).

5.  Press the touch tone [# 2] button to stop the beeping and put the D169 in the listen mode for three minutes. Both of the Mics ports will be selected.

6.  Move the portable radio (or other sound source) to various locations in order to check sound pick-up coverage. Use the touch tone [# 3] command to check both sensitivity levels.

7.  Use the touch tone [# 4] command to check the microphone on port A, and again to toggle to port B (if used).

8.  Check the speaker coverage by entering the talk mode with the touch tone [# 1] command.

**Note**:  This procedure is subject to audio feedback or "howl" when speaker audio gets back into the telephone headset microphone. "Cupping" the telephone microphone with your hands will reduce the possibility of this feedback.

## Monitoring Facility Testing

1.  Monitoring station procedures will vary. Generally, the touch tone functions of the D169 should be used.

### Touch Tone Commands

# 1 Talk to premises (initiates a three minute session time-out)

# 2 Listen to premises (initiates a three minute session time-out)

# 3 Toggle microphone sensitivity Hi/Lo/Normal (if Lo, check audio coverage)

# 4 Toggle Mics ports if more than one is used
Normal:  Both
Port A returns 1 beep
Port B returns 2 beeps

### Other Touch Tone Commands

# 7 Extend 2-way session for three minutes

# 8 Terminate 2-way session and enter callback mode

# 9 Terminate 2-way session (must press #9 twice or hold for one second)

# Trouble Shooting

1. **Symptom**: Premises telephones are inoperative when the D169 is installed.

   *Probable Cause*: D169 is connected in-series with the control panel Telco wiring, which is in turn, connected in-series with the premise phones. An RJ-31X cable mis-wiring or a damaged connector anywhere in the series "string" can cause the problem.

   To isolate the cause, bypass the D169 by connecting the control panel wiring directly to the RJ-31X jack. If the problem persists, the trouble is in the control panel.

   Sometimes an RJ-31X plug end becomes damaged which in turn, can bend the gold connector wires in a jack. Inspect the plugs and jacks, and replace any damaged cables. Repair jacks by straightening the wires with a small screwdriver.

2. **Symptom**: The D169 LED does not come on at the end of an alarm transmission, or blinks and then turns off (indicating the 2-way session was never initiated).

   *Probable Cause*: The Auto-Sense feature requires six or more seconds between the last pulse dialed digit and communicator hang-up. This may be a problem with some high speed formats. Switch to a slower format or try touch tone dialing. If the problem persists with touch tone, program some inter-digit pauses into the dialing sequence to extend the off-hook time. Confirm that the Telco wiring is correct and not damaged by staples. Check for reversed phone jack and control panel jack connections at the D169 board. Use a voltmeter to test for voltage between terminals 1 & 4 and 5 & 8 at the RJ-31X jack when the control panel and D169 are inactive. The same voltage (1.4 to 1.6) should appear across both pairs. If you are testing without a phone line, be sure the D169 is connected to at least T1 and R1 on the control panel.

3. **Symptom**: D169 LED comes on when the customer picks up certain phones.

   *Probable Cause*: Improper phone wiring or a stapled wire.

4. **Symptom**: A hum or radio station is heard on the telephone line when the D169 is installed.

   *Probable Cause*: The telephone line is "unbalanced," meaning that one side of the line is inadvertently connected to something. Look for wires touching adjacent screw terminals on the RJ-31X jack and D169 or even on the control panel. Check for wires or other objects underneath the circuit boards.

5. **Symptom**: Monitoring facility has trouble switching form Listen mode to Talk mode using the [# 1] touch tone command.

   *Probable Cause*: High levels of noise on the premise tend to override touch tone commands. If noise is intermittent try the touch tone command during the lowest noise level. Avoid mounting microphones near noise sources such as fans, air conditioners, and heater vents.

**Radionics**™