**A I** **Audience Interaction Inc.**

# *System Installation and Operation Manual*

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# FCC NOTICE

**NOTE**:  This device complies with Part 15 of the FCC Rules.  Operation is subject to the following two conditions: (1) this device may not cause harmful interference; (2) this device must accept any interference received including interference that may cause undesired operations.

**Modification Warning**

Changes or modifications made to this equipment not expressly approved by the manufacturer may void the user's authority to use the equipment.

# 1. INTRODUCTION

The Audience Interaction wireless system allows you to implement audience interaction technology for meetings, delegate voting, strategic planning, training, customer surveys, focus groups, games shows and more.  AI system hardware, Handsets and Base Station(s), allow audience members to register their responses with your host computer running third-party audience response software.

An AI system is Fleetwood compatible at the interface of the AI system with the host computer.  Although AI Handsets communicate with an AI Base Station using a proprietary protocol, the AI system communicates with the host computer using the Fleetwood Standard Reply® protocol.  Therefore, your third-party audience response software can be configured for an AI system as it would be for Fleetwood hardware.



Fig. 1.  System Communication

This manual covers the installation and operation of an AI system including the following information:

- System Overview — outlines major system components
- Theory of Operation — describes the vote collection process and interface with a user-supplied host computer running third-party audience response software
- System Cabling — includes a cabling diagram for a USB Base Station
- AI Software —outlines the procedure for installing the drivers required with a USB Base Station
- System Operation — describes procedures for configuring third-party audience response software and normal system performance
- Troubleshooting — outlines procedures for troubleshooting the system

## 1.1 Packing List

Depending on system size and options purchased, your AI system should include the following items:

- AI Handsets
- AA batteries
- AI Base Station(s)
- USB cable(s) — 6-foot cable(s)
- USB cable ferrite(s) — one ferrite per USB cable
- AI software CD — includes USB drivers
- Carrying case(s) — optional, purchased separately

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*Note*:  With multiple Base Station configurations, each Base Station and associated Handsets operate on one of 25 channels in the 902-928 MHz band.

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## 1.2 Quick Start Checklist

For those familiar with the basics of audience response software and the AI system, the checklist below outlines the steps to get your AI system up and running quickly:

1. Cable the host computer — do <u>not</u> cable AI system hardware until step 3
2. Power the host computer — be sure boot sequence is complete before proceeding
3. Install a ferrite on the USB cable — see diagram in Section 2.2, Base Stations
4. Cable the AI system — see diagram below
5. Install AI USB drivers — see Section 5.2, USB Drivers
6. Install and launch audience response software
7. Configure audience response software for the appropriate number of Fleetwood-compatible keypads (multiples of 50 Handsets) — see Section 6.1, Audience Response Software
8. Conduct test vote and troubleshoot any problems
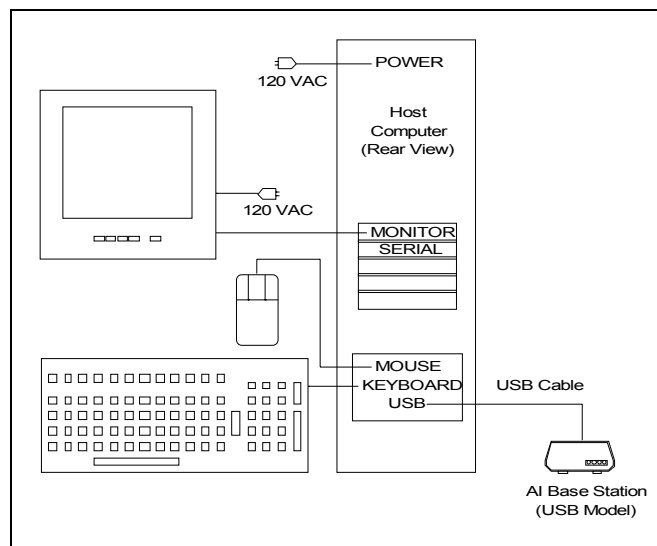


Fig. 2.  Typical System Cabling

## 2. SYSTEM OVERVIEW

A starter AI system consists of up to 250 AI Handsets communicating with an AI Base Station. Typically, the Base Station is located adjacent to the user-supplied host computer.

Fig. 3.  AI System Overview — AI System Hardware and User-supplied Host Computer

The host computer runs user-supplied audience response software in a Windows® environment (Windows 98 or later).  The Handsets and Base Station communicate on one of 25 available channels in the 902-928 MHz band.

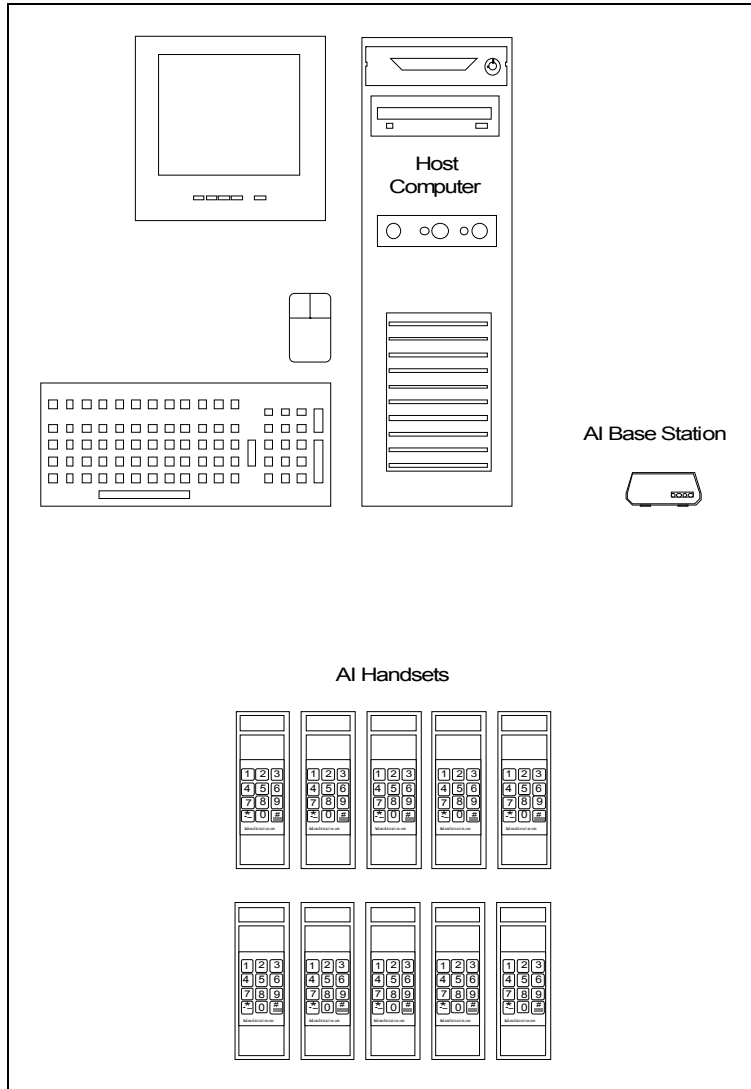The system is designed for reliable communication in an area 300 feet by 300 feet — assuming central placement of the Base Station.  Elevating the Base Station to improve line-of-sight operation may result in a performance advantage.  The diagram below illustrates a typical system installation in a meeting room.
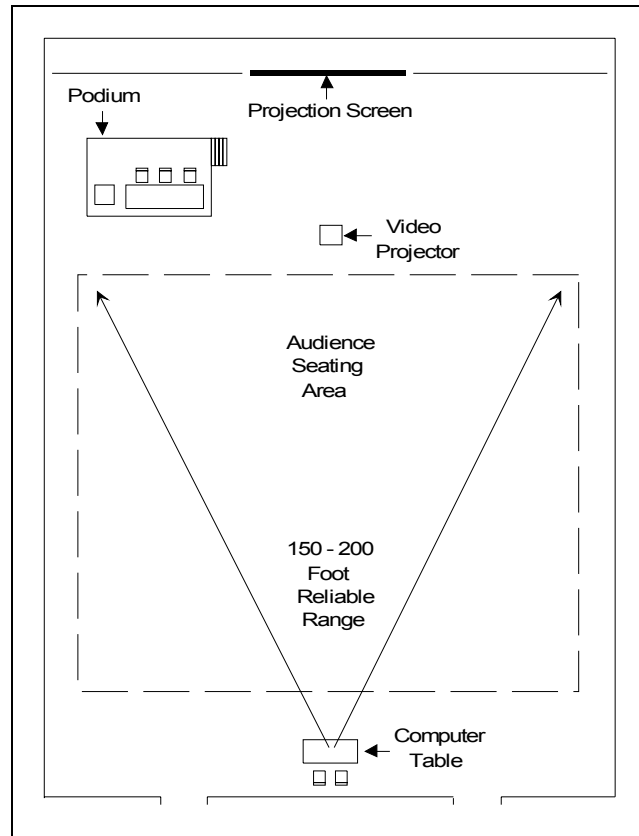


Fig. 4.  Typical Meeting Room Arrangement

Note:  Obstacles or interference may decrease the Handset range.  For mission-critical applications such as house-of-delegate parliamentary voting, Handsets should be located within 125 to 150 feet of the supporting Base Station.

## 2.1  Handsets

AI Handsets feature a rugged, ergonomic, hand-held molded plastic case.

AI Handsets are powered by two AA alkaline batteries. A sliding cover on the bottom of the Handset provides access to the battery compartment.

Handsets use power only when transmitting entered responses and receiving Base Station acknowledgments.  Each keypress is indicated by a tone response.  Batteries provide sufficient power for 50,000+ responses before requiring replacement — 3 to 5 year battery life.

*Note*:  Handsets include ample insert space and can be customized to "personalize" the product.
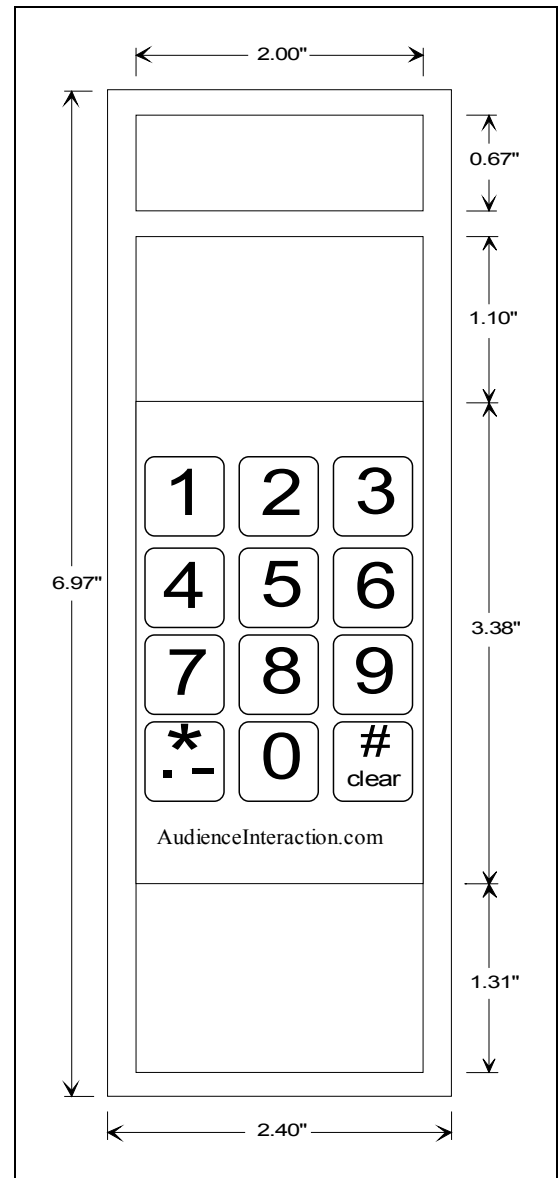


Fig. 5.  AI Handset — Top View
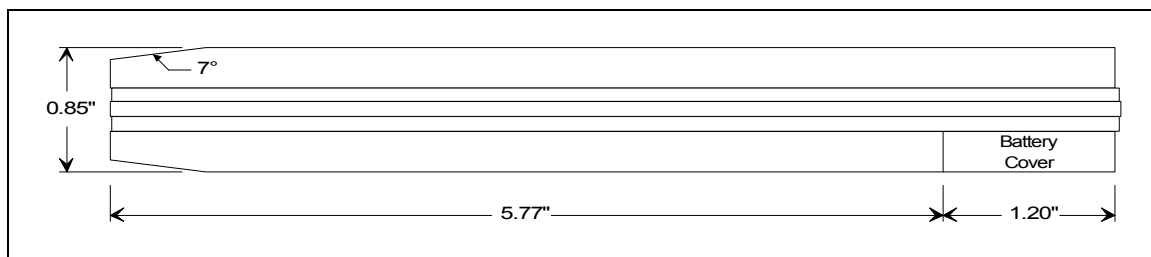


Fig. 6.  AI Handset — Side View

## 2.2  Base Stations

The Base Station communicates with and draws power from the host computer via a USB cable.
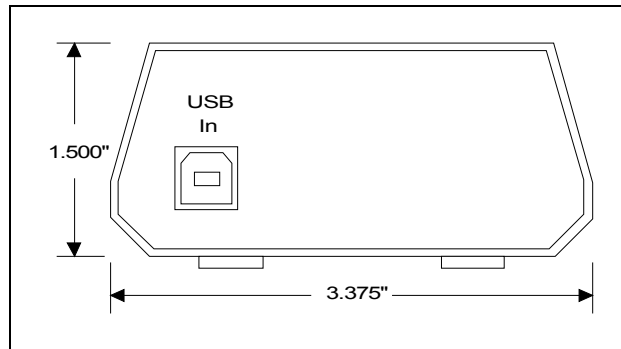


Fig. 7.  AI Base Station — Cabling End View
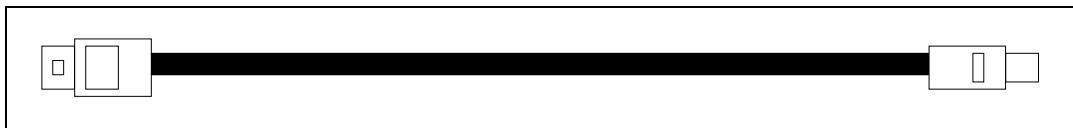


Fig. 8.  USB Cable — Six-foot Cable Supplied

Before you operate the system, the supplied ferrite must be installed on the USB cable as shown here to minimize any spurious emissions.



Fig. 9.  Ferrite — Installed on USB Cable

*Note*:  A USB Base Station version is available currently.  If a USB configuration does not meet your needs, please inquire about other interface options that may be available.

Base Stations feature four LED tally lights.  The illumination patterns on the LEDs allow you to confirm system operation and assist with troubleshooting.
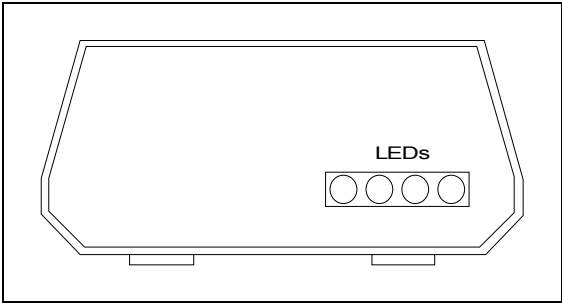

Fig. 10.  AI Base Station — LED Tally Lights

For additional information on tally light function, refer to the System Operation section below.

## 3. THEORY OF OPERATION

The diagram below illustrates a typical system configuration.
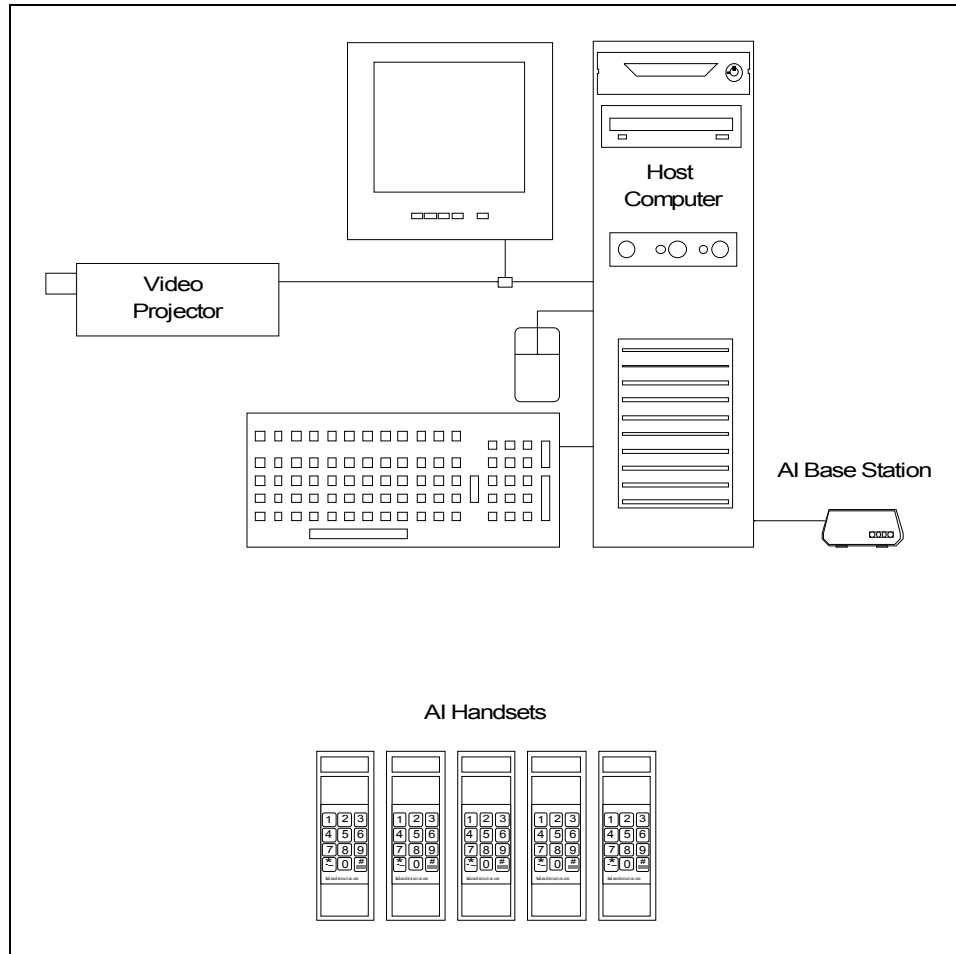


Fig. 11.  Typical System Configuration

During the voting of an audience response question, the following sequence occurs:

- System operator "opens the vote" with the audience response software on the host computer
- Audience response software generates a question display that is projected by the video projector
- Audience members respond to the question by pressing keys on their Handsets
- Handsets register their votes with the supporting Base Station
- System operator "closes the vote" with the audience response software
- Audience response software polls the Base Station and generates a results display that is projected to the audience

Handsets transmit audience votes using radio frequency (RF) signals to the supporting Base Station.  Handsets communicate with their supporting Base Station on one of 25 available channels in the 902-928 MHz frequency range.  Base Stations accumulate votes from associated Handsets and pass them to the host computer via a USB cable.

Each Handset is assigned an identification (ID) number during manufacture.  The supporting Base Station identifies each Handset by its ID number.  A total of 250 Handsets can be managed by a given Base Station (ID 1 through ID 250).

Although the starter system shown above illustrates a single Base Station configuration, several Base Stations can be used to expand the number of Handsets.  Each Base Station requires a USB port and operates on its own channel.

*Note*:  When multiple Base Stations are used, they should be separated at least 18 inches to avoid interference.  Base Stations should not be located near metallic objects.  When a Base Station is placed adjacent to the host computer, place it on top of the computer case.

## 4. SYSTEM CABLING

The diagram below illustrates typical Base Station cabling.  The USB Base Station communicates with and receives power from the host computer via a USB cable.
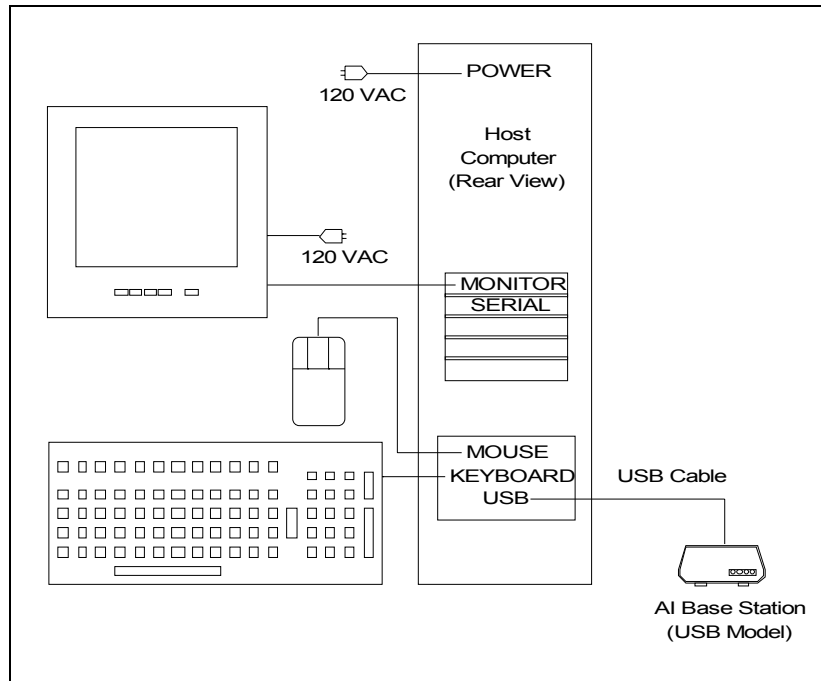


Fig. 12.  System Cabling

# 5.  AI SOFTWARE

Before you can use a USB Base Station, you must install the USB drivers on the AI software CD as described below.

## 5.1  Required Operating System Environment

The AI system requires a Windows 98 (Second Edition) operating system environment or later. The supplied USB files are XP certified.

## 5.2  USB Drivers

AI USB driver files are located on the AI Software CD in the \USB folder.

| Name | Size | Type | Modified |
|------|------|------|----------|
| 2104 Release Info... | 57KB | Microsoft Word Document | 7/22/2002 6:18 PM |
| 800 Release Info.... | 45KB | Microsoft Word Document | 7/22/2002 6:19 PM |
| ComPort.PDF | 6KB | PDF File | 9/7/2000 2:01 PM |
| Ftcomms.vxd | 24KB | Virtual device driver | 7/18/2002 1:05 PM |
| ftdibus.cat | 9KB | Security Catalog | 5/13/2002 7:09 PM |
| ftdibus.inf | 4KB | Setup Information | 4/27/2002 3:37 AM |
| Ftdibus.sys | 18KB | System file | 4/3/2002 12:09 PM |
| ftdiport.cat | 8KB | Security Catalog | 5/13/2002 7:09 PM |
| Ftdiport.inf | 5KB | Setup Information | 4/27/2002 3:40 AM |
| ftdiun2k.ini | 1KB | Configuration Settings | 9/1/2000 8:25 AM |
| Ftdiunin.exe | 405KB | Application | 8/28/2001 7:41 PM |
| Ftdiunin.ini | 1KB | Configuration Settings | 6/13/2001 4:43 PM |
| Ftsenum.sys | 25KB | System file | 7/18/2002 1:05 PM |
| Ftsenum.vxd | 8KB | Virtual device driver | 7/18/2002 1:05 PM |
| Ftser2k.sys | 49KB | System file | 4/3/2002 12:09 PM |
| Ftserial.sys | 58KB | System file | 7/18/2002 1:05 PM |
| Ftsermou.inf | 2KB | Setup Information | 7/5/2000 4:53 PM |
| Ftsermou.vxd | 10KB | Virtual device driver | 7/18/2002 1:05 PM |
| Ftserui.dll | 18KB | Application Extension | 7/5/2000 8:53 AM |
| readme.txt | 2KB | Text Document | 7/22/2002 6:20 PM |

Fig. 13.  USB Driver Files

You must install the USB drivers before they can be used.

To install the USB driver files on the host PC, perform the following steps:

1.  Connect the AI Base Station to a USB port on a powered host computer.

**Add New Hardware Wizard**

This wizard searches for new drivers for:

Audience Interaction USB Support

A device driver is a software program that makes a hardware device work.

< Back | Next > | Cancel
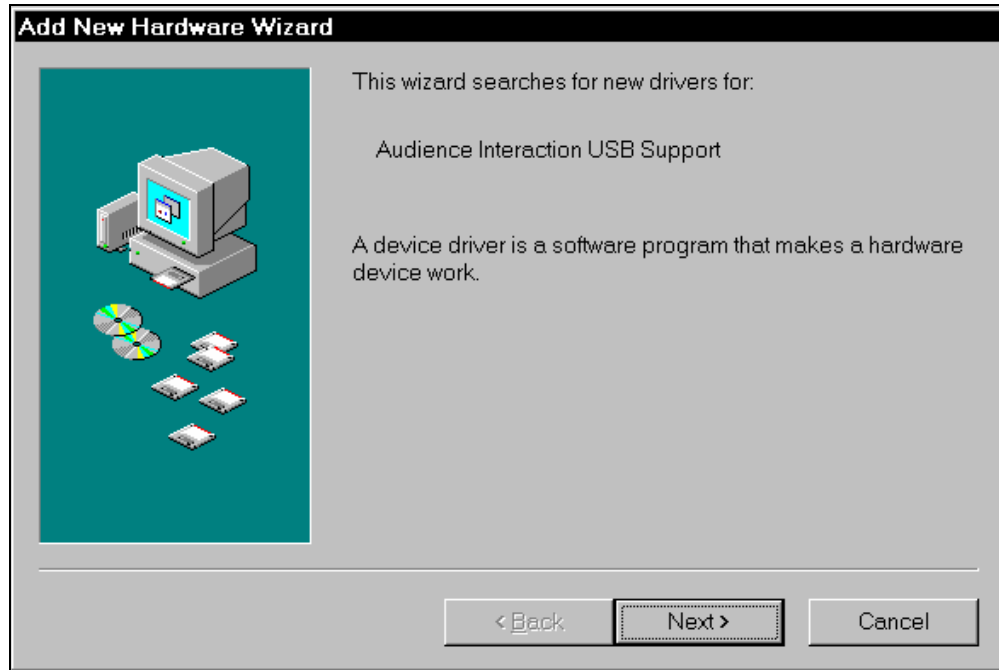
Fig. 14.  Add New Hardware Wizard — Screen 1

Windows will respond by displaying the first screen of the Add New Hardware Wizard shown above.  The installation wizard consists of five interactive screens.  As you complete these screens several progress messages will be displayed.

2.  Click on Next.

Fig. 15.  Add New Hardware Wizard — Screen 2

3. Accept the default (Recommended) search option by clicking on Next.



Fig. 16.  Add New Hardware Wizard — Screen 3

4. Check the "Specify a location" box, use the Browse button to navigate to the folder containing the USB driver files (D:\IRIS\USB_DVR in this example) and click Next.

Fig. 17.  Add New Hardware Wizard — Screen 4

5.    Accept the USB driver location by clicking on Next.



Fig. 18.  Add New Hardware Wizard — Screen 5
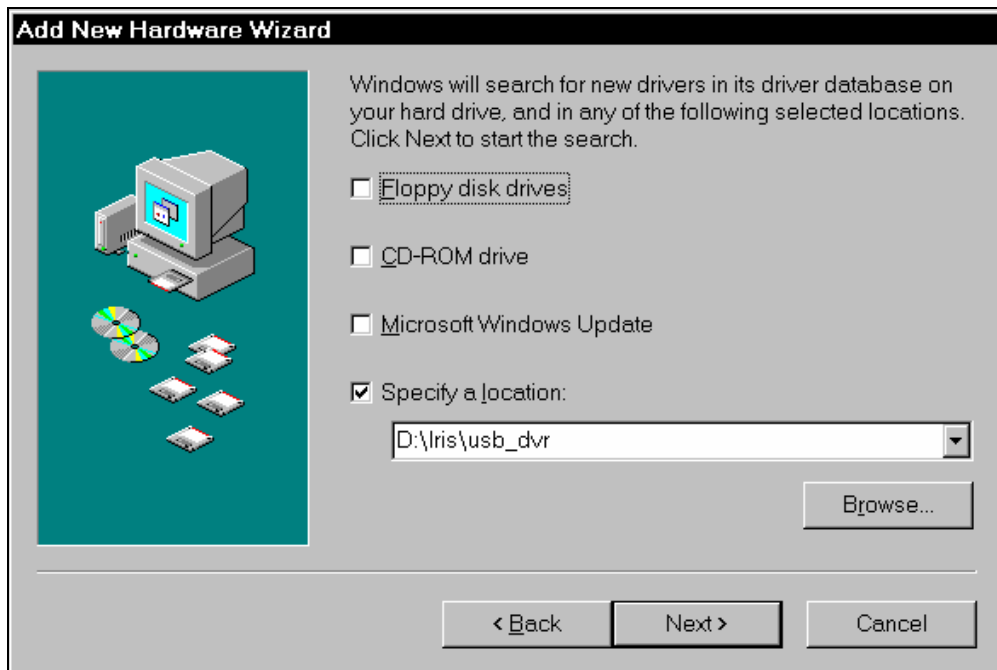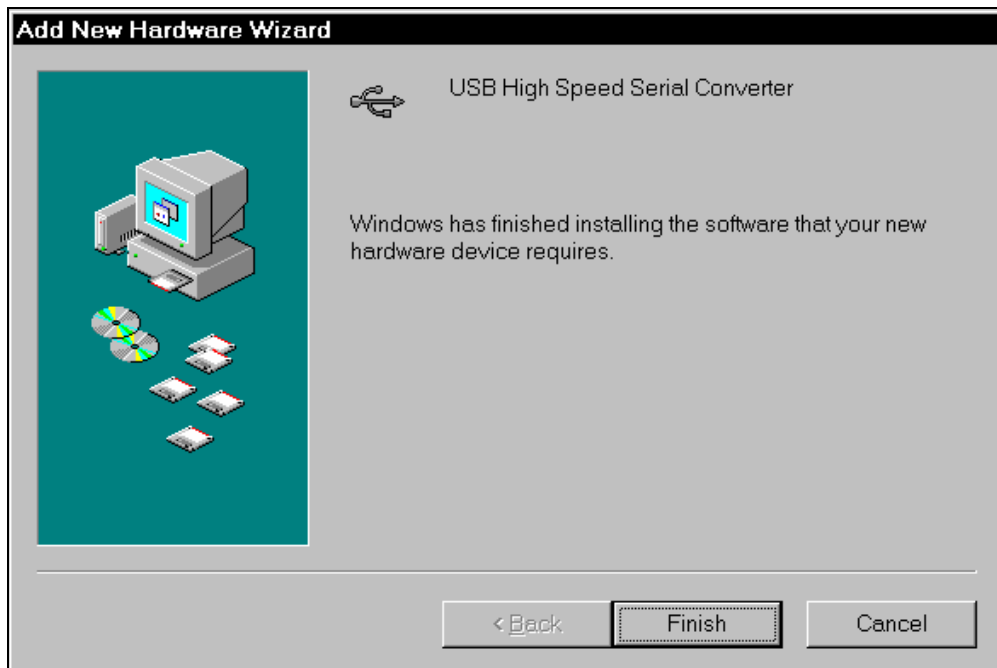
6.    Click Finish.

Following the installation of the USB drivers, you should confirm the installation by noting the illumination pattern on the Base Station tally lights.  For additional information on tally lights, refer to the System Operation section below.

## 6.  SYSTEM OPERATION

The sections below describe the configuration of typical audience response software to interface with an AI system.  For additional information on configuring your audience response software, refer to your user documentation.  The characteristics of normal AI system operation are also discussed.  For information on AI system troubleshooting, refer to the Troubleshooting section.

### 6.1  Audience Response Software

Before you can collect and display votes with the AI hardware, you must install and configure your audience response software.

*Note*:  The AI system is software-compatible with the communication protocol used by Fleetwood Standard Reply® keypads.  When you configure your audience response software, select the "Fleetwood" or "Fleetwood Standard" option as appropriate.

Configuring audience response software usually involves the following:

- Selecting the type of keypad hardware being used — "Fleetwood" or "Fleetwood Standard"
- Selecting the COM port to which the base station is attached — may be detected automatically
- Identifying the number of keypads supported by the base station

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*Note*:  In general, audience response software packages support Fleetwood-compatible Handsets in groups of 50.  Therefore, you should configure your package for one of the following groups depending on the number of Handsets purchased:

| Beginning Handset Number | Ending Handset Number |
|---|---|
| 1 | 50 |
| 1 | 100 |
| 1 | 150 |
| 1 | 200 |
| 1 | 250 |

Thus, if you purchased 125 Handsets (ID 1 through 125), you would configure your audience response software for a Handset grouping 1 through 150.

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If your audience response software does not automatically detect the COM port to which the Base Station is attached, you can identify the USB port number by performing the following steps:

1. Attach the AI Base Station to a USB port
2. Navigate to the Windows Device Manager —
   Start | Settings | Control Panel | System | Device Manager
3. Expand the Ports option by clicking on its "+" symbol
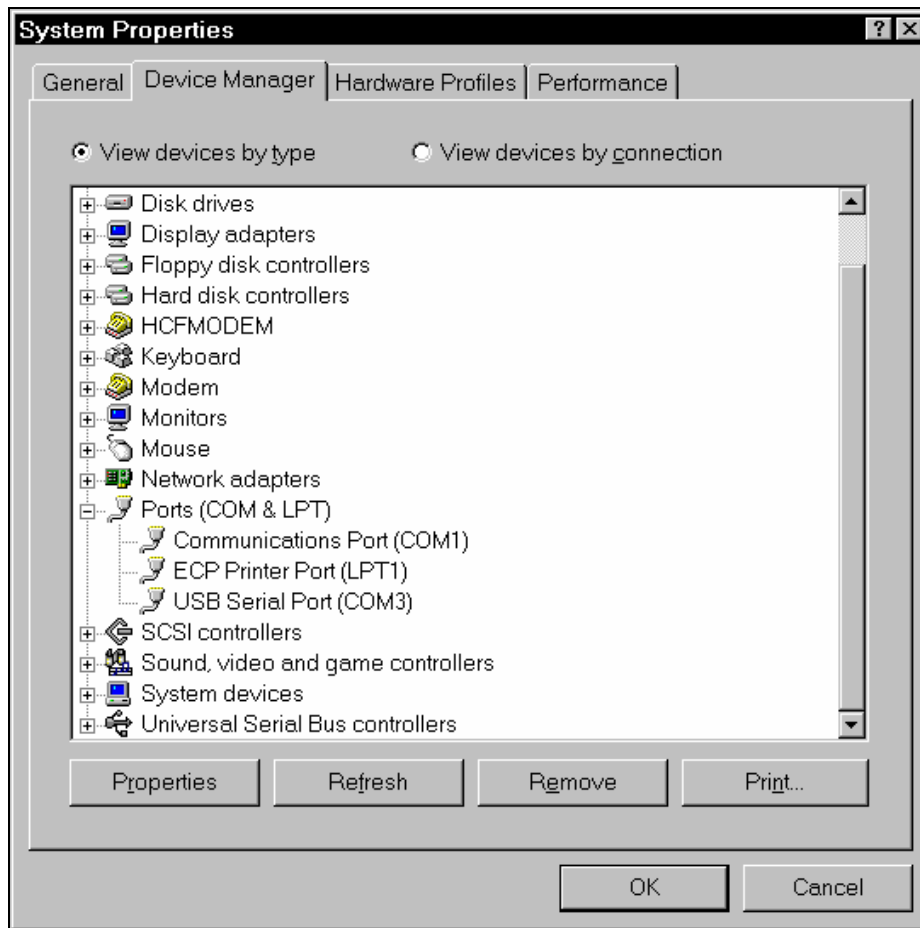4. Note the USB Serial Port (COM3 in the example below)

Fig. 19. Identifying USB Serial Port Number

### 6.2  Normal AI System Operation

After the system has been installed and powered successfully, the Base Station tally lights should exhibit the following illumination pattern:

- The Power LED remains illuminated continuously
- The Report to Host LED flashes slowly
- The Rx LED illuminates whenever a key is pressed on a supported Handset
- The Tx LED flashes rapidly — the rapid flash can be difficult to see with bright lighting



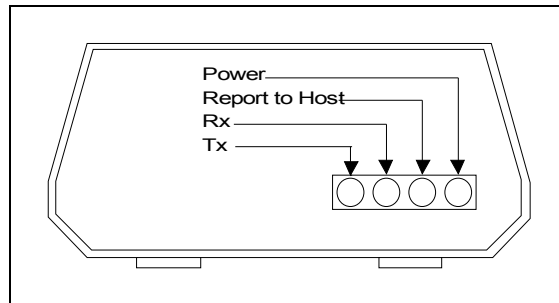Fig. 20.  AI Base Station — LED Tally Lights

### 6.3  System Testing

After the system has been installed as outlined in the Quick Start Checklist, it is important to conduct several test votes.  Final system testing is designed to confirm the proper operation of all components in the current meeting environment — host computer, audience response software, Base Station, Handsets and system cabling.

## 7. TROUBLESHOOTING

This section focuses on system troubleshooting — procedures for identifying and repairing problem components.

At this point, you should have accomplished the following:

- Powered the host computer
- Cabled the AI system
- Installed AI USB drivers
- Installed and launched the audience response software
- Configured the audience response software for an appropriate number of "Fleetwood" or "Fleetwood Standard" hardware
- Conducted test votes

Successful system troubleshooting is based on several factors including:

- A systematic procedure
- Identification of problem scope
- Knowledge of component operation

### 7.1 Basic Methodology

It is important to approach troubleshooting in a systematic way, working on one component at a time. Obviously, if you change two components before retesting, you cannot be sure which change produced the solution. As soon as you check a component, perform a test vote to confirm the resolution or continuation of the problem.

Various diagnostic aids are built into system components including LEDs on the Base Station.

## 7.2  Sample Configuration

The illustration below of a sample USB configuration may be helpful in visualizing troubleshooting procedures.
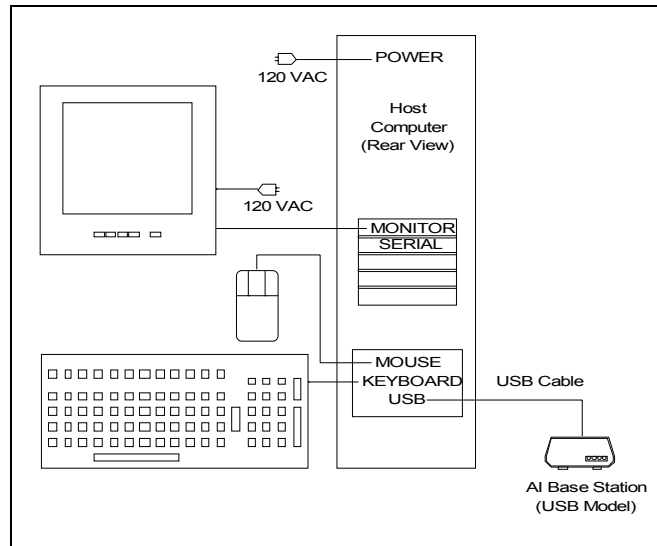


Fig. 21.  Typical System Cabling

## 7.3  Identifying Problem Scope

The scope of a problem is an important factor in troubleshooting.  For example, if a single Handset is not functioning, your troubleshooting will focus at the Handset level.  If an entire channel is not functioning, the focus of your troubleshooting will include the supporting Base Station, USB cable, USB port and audience response software configuration.  If no votes are received during a test vote or the pattern of votes is atypical, the host computer and audience response software become the focus of your troubleshooting.

The sections below contain checklists for various types of problems.  Each checklist describes a problem and includes various things to check and things to try.

| *Problem:* | Problem description |
| --- | --- |
| *Check:* | Things to check? |
| *Try:* | Things to try |

When a check reveals the source of the problem, the solution is generally self-evident.  When all checks fail to solve the problem, generally one of the listed things to try will resolve the malfunction.

### 7.3.1  Individual Handset Problems

When a Handset fails to register a vote, perform the following:

| *Problem:* | Handset does not register a vote |
| --- | --- |
| *Check:* | Batteries OK? |
| *Check:* | Distance to supporting Base Station within reliable transmission range? |
| *Try:* | Replace the Handset |

Generally, replacing the Handset's batteries will resolve most individual Handset problems.

### 7.3.2  Communication Channel Problems

If you are using multiple Base Stations, it is good operating practice to install Handsets so that a given channel serves a given section of the meeting room.  Using this arrangement, problems with a given section equate to problems with a given channel.

If all Handsets in a given section do not respond, the problem may relate to one or more of the following:

- The supporting Base Station
- The connecting USB cable
- The audience response software configuration
- The USB port on the host computer

When Handsets on a given channel fail to register votes, perform the following:

| | |
|---|---|
| *Problem:* | A complete section (channel) does not register votes |
| *Check:* | Base Station "Power" LED illuminated continuously |
| *Check:* | Base Station "Report to Host" LED flashing slowly |
| *Check:* | Base Station Rx LED illuminates after each Handset keypress |
| *Check:* | Base Station Tx LED flashing rapidly (can be difficult to see) |
| *Check:* | Base Station and Handsets using the same channel? |
| *Check:* | USB cable connections tight? |
| *Check:* | Base Stations separated at least 18 inches? |
| *Check:* | Base Station near metallic objects? |
| *Check:* | Audience response software configured properly? |
| *Check:* | Distance to Base Station within reliable transmission range? |
| *Check:* | USB port functional? |
| *Try:* | Boot the host computer |
| *Try:* | Boot the Base Station |
| *Try:* | Replace the USB cable |
| *Try:* | Replace the Base Station (same channel) |

> *Note*:  You can check the functionality of a USB port by temporarily moving a proven piece of equipment to the suspect port and retesting its functionality.

### 7.3.3 Problem Areas in the Room

If a small number of adjacent Handsets do not respond, the problem may be related to their location. The Handsets may be located beyond the reliable transmission range, or there may be some form of radio frequency (RF) interference in that area of the room.

> *Note*: To date, interference from other RF sources (such as wireless microphones or video equipment) has not been a problem with AI system hardware. Although rare, large metallic surfaces that may be concealed in walls or partitions can present problems for RF signals.

This problem can also result from errors in the configuration of the audience response software. For example, when the audience response software is configured for Handset ID 1 through 50, but Handsets 1 through 75 are present.

When several adjacent Handsets on a given channel fail to register votes, perform the following:

| | |
|---|---|
| *Problem:* | A portion of a section does not register votes |
| *Check:* | Distance to Base Station within reliable transmission range? |
| *Check:* | Audience response software configured properly? |
| *Check:* | Base Stations separated at least 18 inches? |
| *Check:* | Base Station near metallic objects? |
| *Try:* | Replace Handset(s) |

### 7.3.4 Room-Level Problems

When an entire meeting room does not report any votes or the voting pattern is atypical, the host computer and audience response software become the focus of the troubleshooting activities. An atypical voting pattern usually occurs when the audience response software is configured for fewer Handsets than actually installed in the meeting room.

In a multiple Base Station configuration where an entire meeting room fails to register votes, perform the following:

| | |
|---|---|
| *Problem:* | The entire room does not register votes |
| *Check:* | Audience response software configured properly? |
| *Check:* | Host computer cabled properly? |
| *Try:* | Boot the host computer |

> *Note*: For room-level problems with a single Base Station configuration, refer to the communication channel problem checklist.

## 7.4  Handset Repair

AI Handsets are rugged, highly reliable and should require little if any maintenance other than periodic battery replacement.  If the suggestions in the Troubleshooting sections above do not resolve a malfunction, it may be worthwhile to open the Handset case.  Most of the Handset components are permanently installed and cannot be changed in the field.  Although unlikely, extremely rough handling might dislodge the batteries, the keypad connector or jumper.

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*Note*:  When a Handset does not function properly, the cause is usually battery-related — either depleted or slightly dislodged batteries.

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Opening the Case

To inspect Handset circuitry, open the case by performing the following steps:

1.  Turn the Handset over and slide the battery compartment cover off.

2.  Remove the AA batteries.

3.  Remove the two screws joining the top and bottom of the case.

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*Important*:  A discharge of static electricity from a finger or other conductor may damage electronic circuitry.  In general, avoid touching pins, leads or circuitry.  Before handling any of the internal components, be sure that you have discharged static electricity by briefly touching a grounded metal object.
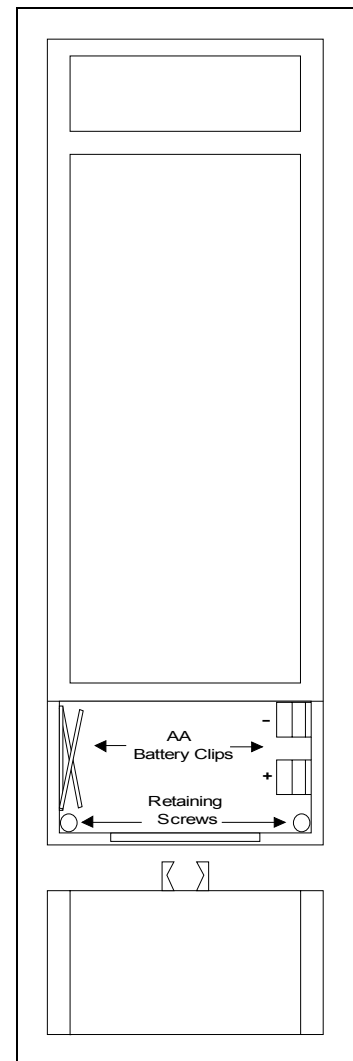
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Fig. 22.  Opening Battery Compartment

4. Grasping the top and bottom of the Handset, slide the top in the direction of the battery compartment — approximately 3/16".
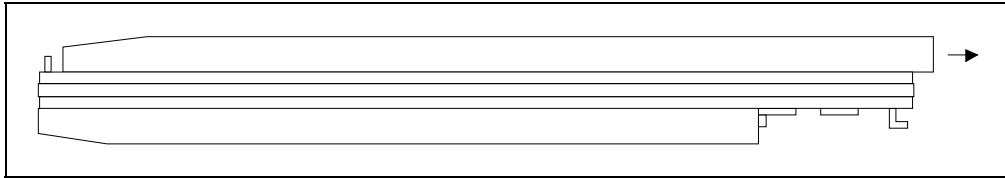

Fig. 23.  Opening Handset Case

*Note*:  The top and bottom of the Handset are joined by two battery wires.

5. Gently separate the top and bottom of the Handset and position them along side of each other as shown below.



Retaining
Clips

Retaining
Clip
Sockets

Handset
Top

Handset
Bottom

Circuit Board
Retainer

Keypad
Connector

Jumper
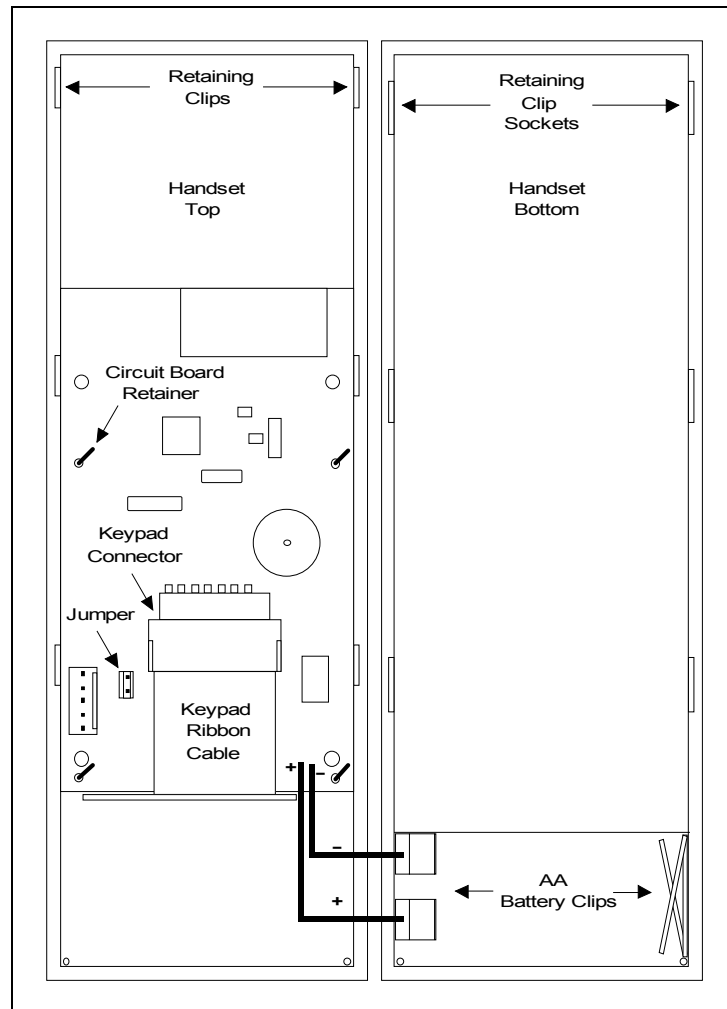
Keypad
Ribbon
Cable

+  −

−

+

AA
Battery Clips

Fig. 24.  Handset — Case Open

## Diagnostic Checks

- Handset circuitry is mounted on a printed circuit board. The circuit board is mounted with four circuit board retainers. Make sure the circuit board is firmly in place — gently bend the circuit board retainers if necessary.

- Check that the jumper shown is in place. If the jumper has become dislodged, carefully reseat it.

- Check that the keypad ribbon cable is securely joined to the keypad connector.

## Assembling the Case

To assemble the Handset case, reverse the opening procedure — join the top and bottom of the Handset, make sure the battery wires are routed behind the battery clips, install the case screws, install the batteries and replace the battery compartment cover.

> *Note*: When you install batteries in a properly functioning Handset, you should hear a short series of tones.

## All Diagnostic Efforts Fail

If none of the troubleshooting and repair steps overcome the malfunction, replace the Handset with a spare (operating on the same channel) if available, label the defective unit with a description of the problem and contact Audience Interaction.
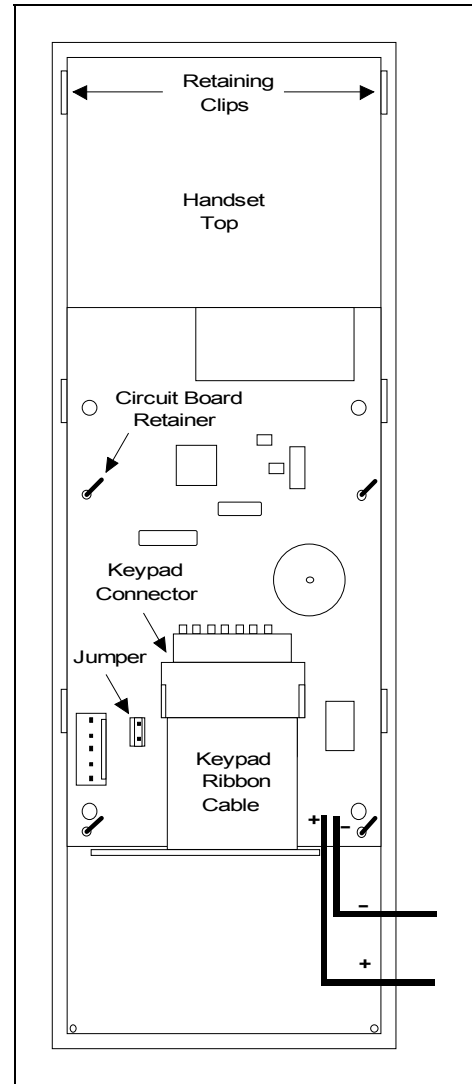


Fig. 25. Handset Circuit Board

## 7.5  Base Station Repair

AI Base Stations are highly reliable and should require little if any maintenance.  If the suggestions in the Troubleshooting sections above do not resolve a malfunction, it may be worthwhile to open the Base Station case.  Most of the Base Station's components are permanently installed and cannot be changed in the field.  Although unlikely, extremely rough handling may affect internal jumper settings.

Opening the Case

> *Important*:  Disconnect all cabling from the Base Station before opening the case.  Do not connect any cabling to the Base Station until the case is closed.

To inspect Base Station circuitry and jumper settings, open the case by performing the following steps:

1.  From the bottom of the Base Station, remove the four screws securing the cover.

2.  Carefully lift the cover and remove the two end pieces if they are loose.

> *Important*:  A discharge of static electricity from a finger or other conductor may damage electronic circuitry.  In general, avoid touching pins, leads or circuitry.  Before handling any of the internal components, be sure that you have discharged static electricity by briefly touching a grounded metal object.

<u>Diagnostic Checks</u>

Base Station circuitry is mounted on two printed circuit boards — a motherboard (MB) and a daughterboard (DB) suspended above. Each circuit board is mounted with four screws.
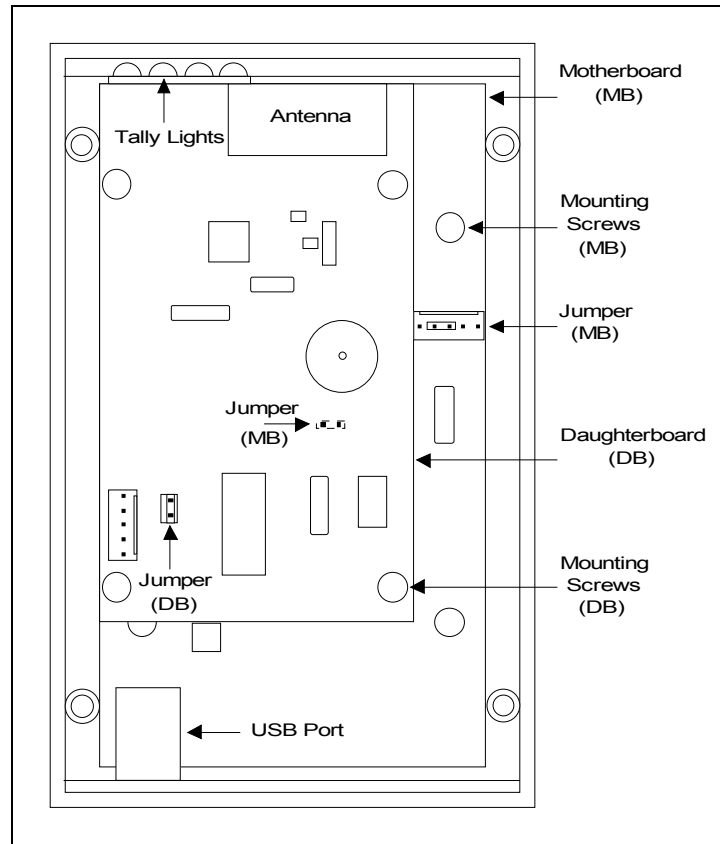


Fig. 26. Base Station — Cover Removed

Check the three jumper settings shown above — two on the motherboard and one on the daughterboard. If any of the jumpers have become dislodged, carefully reseat them.

<u>Assembling the Case</u>

To assemble the case, reverse the opening procedure — replace the end pieces, cover and case screws.

<u>All Diagnostic Efforts Fail</u>

If none of the troubleshooting and repair steps overcome the malfunction, replace the Base Station with a spare (operating on the same channel) if available, label the defective unit with a description of the problem and contact Audience Interaction.