

# System 400

## Wireless Drive-Thru Audio System

### Installation Instructions

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HM ELECTRONICS, INC.

V.2

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# SECTION 1. SYSTEM DESCRIPTION

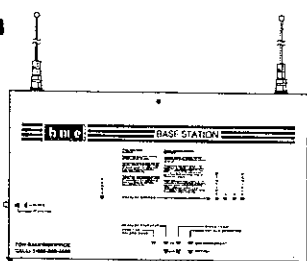
## 1.1 GENERAL

The System 400 is a wireless audio system primarily for use at quick-service restaurants. An optional vehicle detector board can also be used with the system.

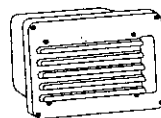
As you unpack the System 400, check the packing list for each item to verify receipt of all components and equipment listed.

## 1.2 EQUIPMENT

**Base Station**  
(one each)



**Outside Speaker and Microphone**  
(One or more of each)

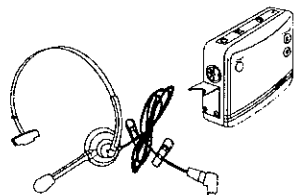


**DM2**  
Microphone

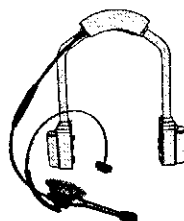


**SP2500LP**  
Speaker

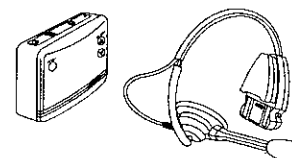
**COMMUNICATOR®**  
(one or more of the following types)



**COM400BP**



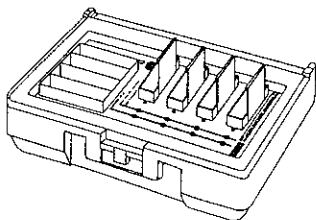
**COM400CC**



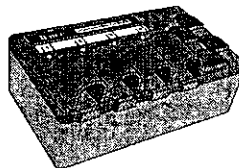
**COM430BP**

**Battery Charger**

(one or more of the following types, depending on which Communicator/s will be used)



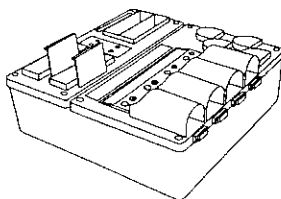
**AC420**



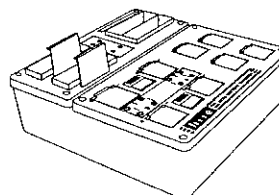
**AC900**



**AC30**



**AC910**



**AC930**

Figure 1. System 400 standard equipment

## 1.2.1 Base Station

### Front –

- **POWER light** is on when the base station has power.
- **MESSAGE RECORD light** is on **RED** when the base station is ready to record message #1 for the message repeater, and blinking **RED** while message #1 is being recorded. It is on **GREEN** when the base station is ready to record message #2 for the message repeater, and blinking **GREEN** while message #2 is being recorded. The MESSAGE REPEATER button must be pushed IN.
- **RECEIVE light** is used for troubleshooting, and is on during channel-A and channel-B transmissions.
- **“A” light** is on during channel-A transmission.
- **“B” light** is on during channel-B transmission.
- **VEHICLE light** is on when a vehicle is present in the drive-thru lane or when system is in vehicle-detect override.

### Bottom –

- **PUSH FOR RECORD MODE button**; must be pushed IN and released once to prepare the base station to record message #1 for the message repeater, or pushed IN and released twice to record message #2.
- **MESSAGE REPEATER button**; must be pushed IN to use the message repeater, OUT when the message repeater is not being used.
- **SPEED TEAM button**; must be pushed IN for speed-team operation, OUT for normal drive-thru operation
- **VEHICLE DETECTOR button**; to override a vehicle detector, push and leave IN; to reset vehicle detector, push IN and leave IN for 5 seconds, then push again and leave OUT for normal vehicle detection.

### Left Side –

- **WIRED/WIRELESS button**; must be OUT when using the wireless System 400, IN when using a wired backup system.

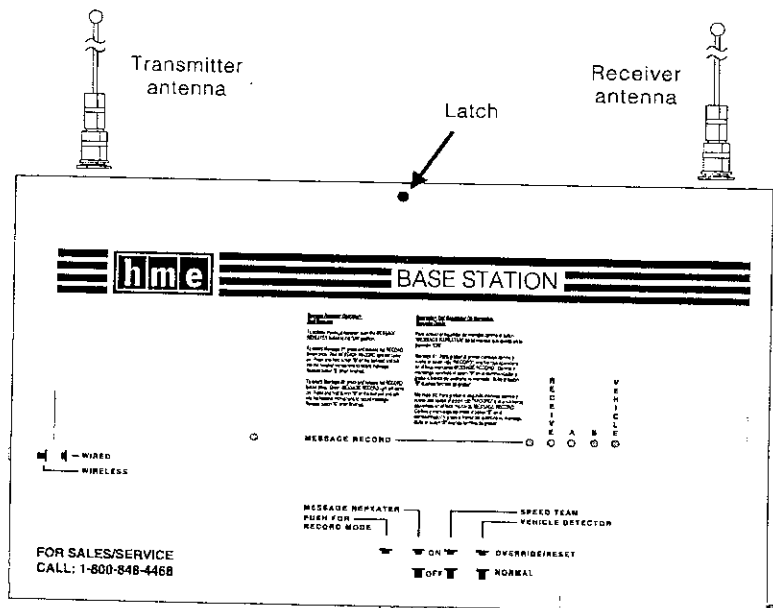


Figure 2. System 400 base station

## 1.2.2 COMMUNICATOR®s

If it is necessary to change the operating frequency of the System 400, the SW1 frequency selection switch settings in the Communicator and the SW1 DIP switch settings in the base station must both be reset. The transmit frequency in the Communicator must match the receive frequency in the base station, and the receive frequency in the Communicator must match the transmit frequency in the base station. SW1 frequency selection switch locations are shown in the following sections for each type Communicator. Location of the SW1 DIP switch in the base station is shown in Figure 37.

Frequency Selection Switch Settings					
Communicator Transmit Frequency and Base Station Receive Frequency		DIP Switch Settings			
Single Lane *Dual Lane 1	*Dual Lane 2	1	2	3	4
468.4875	468.8375	OFF	OFF	OFF	OFF
468.7625	469.1375	ON	OFF	OFF	OFF
468.8375	469.4625	OFF	ON	OFF	OFF
469.1375	469.6375	ON	ON	OFF	OFF
469.4625	469.6625	OFF	OFF	ON	OFF
469.6375	469.8875	ON	OFF	ON	OFF
469.6625	468.4875	OFF	ON	ON	OFF
469.8875	468.7625	ON	ON	ON	OFF

Communicator Receive Frequency and Base Station Transmit Frequency		DIP Switch Settings			
Single Lane *Dual Lane 1	*Dual Lane 2	5	6	7	8
457.5125	457.5625	OFF	OFF	OFF	OFF
457.5375	457.5875	ON	OFF	OFF	OFF
457.5625	457.6125	OFF	ON	OFF	OFF
457.5875	457.5125	ON	ON	OFF	OFF
457.6125	457.5375	OFF	OFF	ON	OFF

**NOTE:** Switch #1 in the Communicator is on the left side.

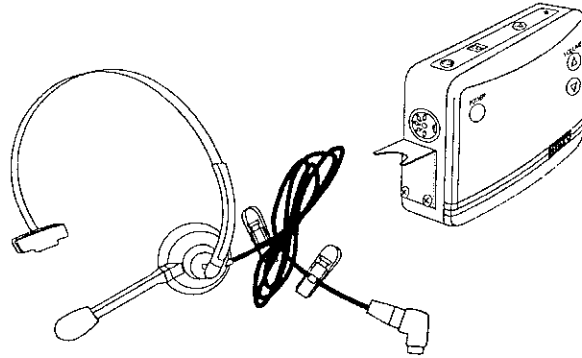
\*Switch #9 in the Communicator is for enabling the dual-lane feature.

ON = dual-lane                      OFF = single lane

Switch #10 enables the latching feature.

ON = latching enabled              OFF = latching disabled

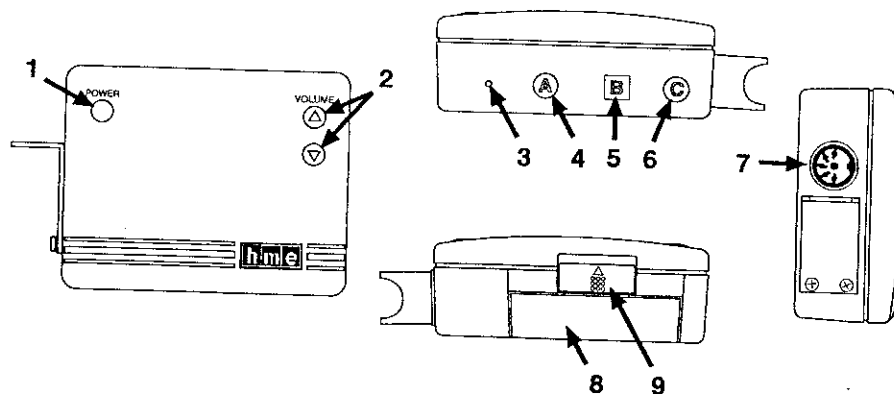
## 1. COM400BP



**Figure 3. COM400BP COMMUNICATOR®**

The COM400BP COMMUNICATOR® consists of a belt-pac transceiver unit and a light-weight headset designed to be used with the HME Wireless Drive-Thru Audio System 400. The Communicator is worn around the user's waist, on either side, and the headset plugs into a connector on the transceiver unit.

### Controls and Connector:



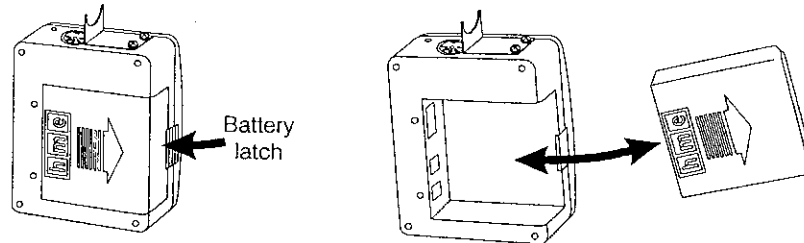
**Figure 4. Communicator controls, connector and indicator light**

- 1 – **POWER button** - turns Communicator on and off.
- 2 – **VOLUME buttons** - adjust listening level in earpiece.
- 3 – **Power-on light** - lights when power goes on, and remains lit until battery needs replacing or Communicator is turned off. The power-on light blinks when transmitting on "A" or "B" channel.
- 4 – **Button A** - allows two-way communication when pushed and held; when it is released, the user can listen only.
- 5 – **Button B** - must be pushed and held to talk, and released to listen.
- 6 – **Button C** - used to change lanes in dual-lane operations.
- 7 – **5-pin DIN receptacle** - receptacle for earpiece/microphone cable connector.
- 8 – **Battery** - provides power for the transceiver unit.
- 9 – **Battery release latch** - slides to release battery for removal, and snaps in place when a battery is inserted to secure battery in Communicator.

### COM400BP Batteries:

When a good battery is in the Communicator and the power is on, the red light on top of the unit will be lit. This light only indicates the power is on. It does not indicate how much power is left in the battery. As a battery weakens during routine use, a repeating beep will be heard in the earpiece, indicating the battery needs to be replaced. Typical battery life with normal use is 8 to 10 hours.

**CAUTION:** To prevent damage, be sure the Communicator is turned OFF before installing or removing batteries.



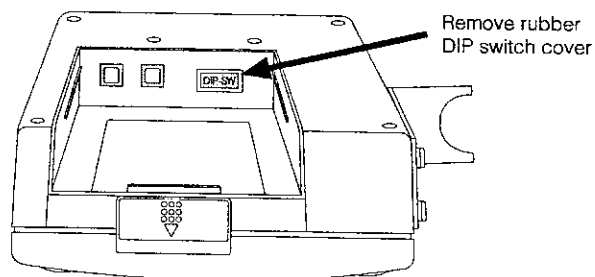
**Figure 5. COM400BP battery removal and replacement**

To remove the battery from a Communicator, slide the battery latch open and push the battery in the direction of the large arrow on the battery

Install a fully charged battery in the battery compartment with the arrow on the battery pointing out as shown in Figure 5. Slide it into the tracks on both sides of the compartment until its catch clicks securely in place.

### COM400BP Frequency Selection Switch Location:

To access the Communicator frequency selection DIP switch, SW1, remove the battery from the Communicator and remove the rubber DIP switch cover shown in Figure 6. Refer to the table on page 3 for DIP switch settings.



**Figure 6. COM400BP frequency selection DIP switch location**

## 2. COM400CC

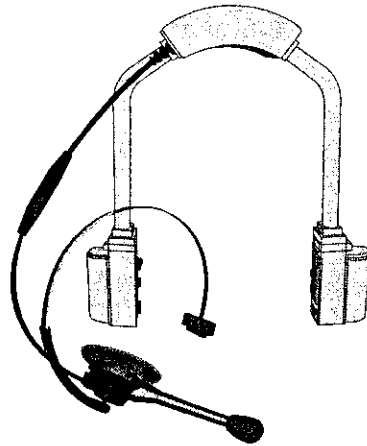


Figure 7. COM400CC COMMUNICATOR®

The COM400CC COMMUNICATOR® consists of a transceiver unit and a lightweight headset designed to be used with the HME Wireless Drive-Thru Audio System 400. The transceiver is worn around the collar, and the headset plugs into a connector on the transceiver unit. Clothing clips on the transceiver clip to the collar to hold it in place.

### Controls and Connector:

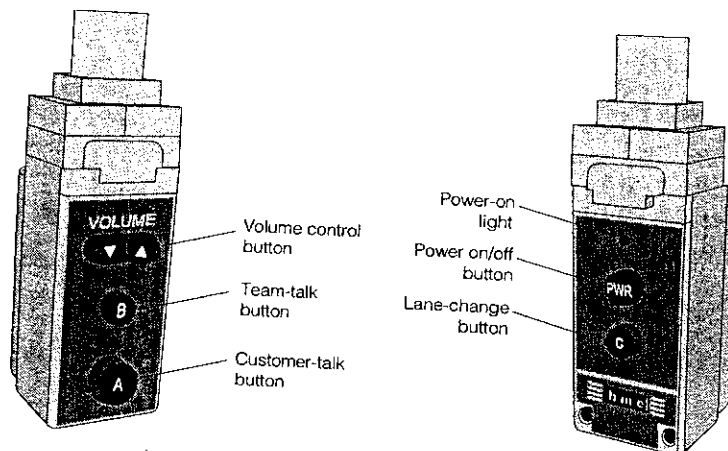


Figure 8. COM400CC control buttons

Plug the headset cable connector into the cable connector on the COM400CC collar unit, as shown in Figure 9. Be careful to correctly match the positions of the pins inside the connector.

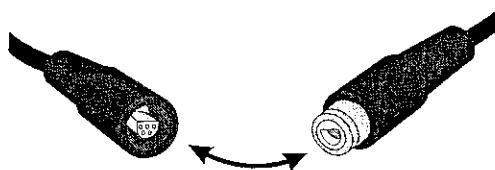


Figure 9. Cable connectors showing matching pin positions



### COM400CC Batteries:

The COM400CC uses "smart batteries." That means each battery maintains a history of the number of times it has been charged. When there are good batteries in the COMMUNICATOR® and the power is on, the red light above the power (PWR) button will be lit. This light only indicates the power is on, not how much power is left in the batteries. As the batteries weaken during routine use, a repeating beep in the earpiece indicates the batteries need to be replaced. When this happens, remove the batteries from the Communicator as shown in Figure 10. Replace the batteries in the Communicator with fresh, fully charged batteries. Typical battery life with normal use is 8 to 10 hours.

**CAUTION:** To prevent damage, turn Communicator OFF before removing or installing batteries.

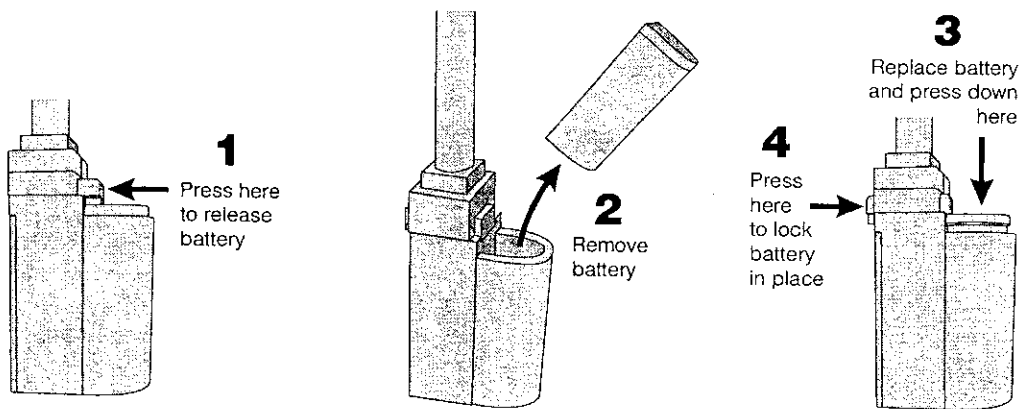


Figure 10. COM400CC battery removal and replacement

### COM400CC Frequency Selection Switch Location:

To access the Communicator frequency selection DIP switch, SW1, turn the power off. Remove the panel covering the DIP switch with a Phillips (crosspoint) screwdriver as shown in Figure 11.

Refer to the table on page 3 for DIP switch settings.

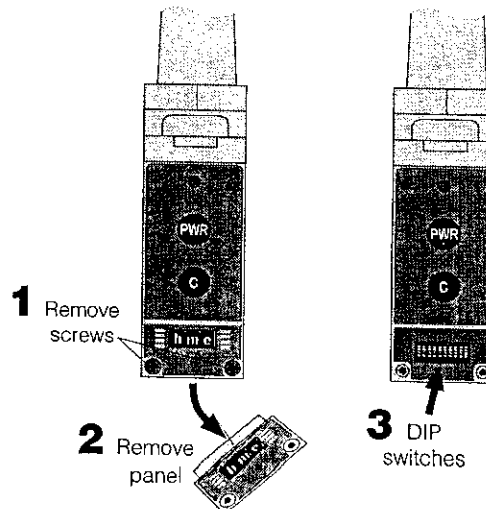


Figure 11. COM400CC frequency selection DIP switch location

### 3. COM430BP

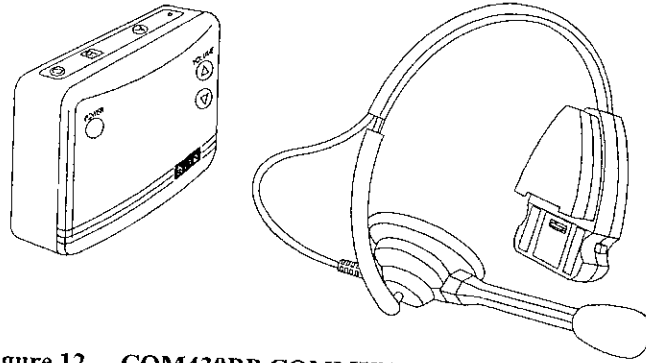


Figure 12. COM430BP COMMUNICATOR®

The COM430BP COMMUNICATOR® consists of a belt-pac transceiver unit and a wireless headset designed to be used with the HME Wireless Drive-Thru Audio System 400. The belt-pac unit is worn in a pouch that clips to a belt or waistband at the user's waist.

**NOTE: Both the belt-pac unit and the headset transceiver (the side opposite the earpiece) must be worn in upright positions, on the same side of the body.**

#### Controls:

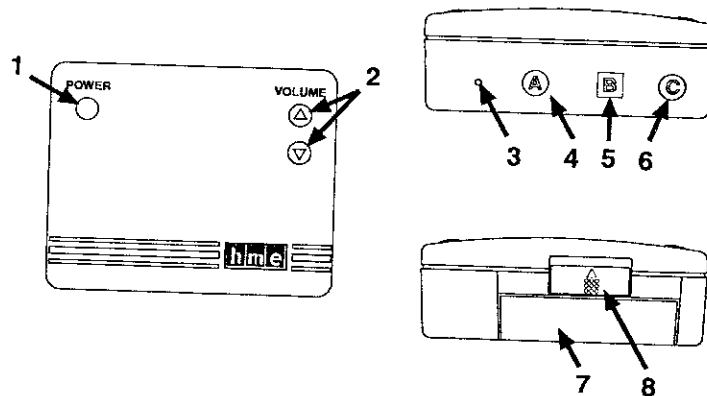


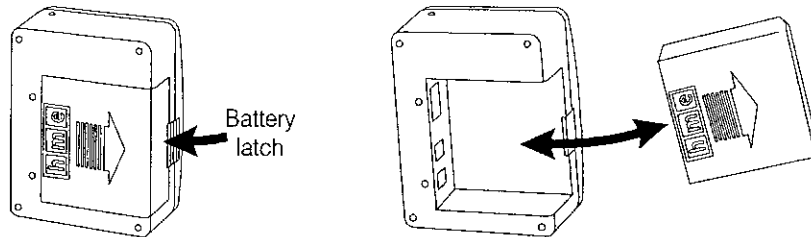
Figure 13. Communicator controls and indicator light

- 1 – **Power button:** turns Communicator on and off.
- 2 – **Volume control buttons:** adjust listening level in earpiece.
- 3 – **Power-on light:** lights yellow when Communicator power goes on, and red when the HS30 Headset is also turned on. The power-on light also indicates when the Communicator is transmitting in single or dual-lane mode and when batteries need replacing.
- 4 – **Button A:** allows two-way communication when pushed and held; when it is released, the user can listen only.
- 5 – **Button B:** must be pushed and held to talk, and released to listen.
- 6 – **Button C:** used to change lanes in dual-lane operations.
- 7 – **Battery:** provides power for the transceiver unit.
- 8 – **Battery release latch:** slides to release battery for removal, and snaps in place when a battery is inserted to secure battery in Communicator.

## COM430BP Batteries:

When a good battery is in the COMMUNICATOR® transceiver and the power is on, the yellow light on top of the unit will be lit. When the HS30 Headset also has a good battery in it, and is on, the light on the belt-pac transceiver unit will be red. This light indicates the power is on, and that there is a link between the headset and belt-pac transceivers. It does not indicate how much power is left in the batteries.

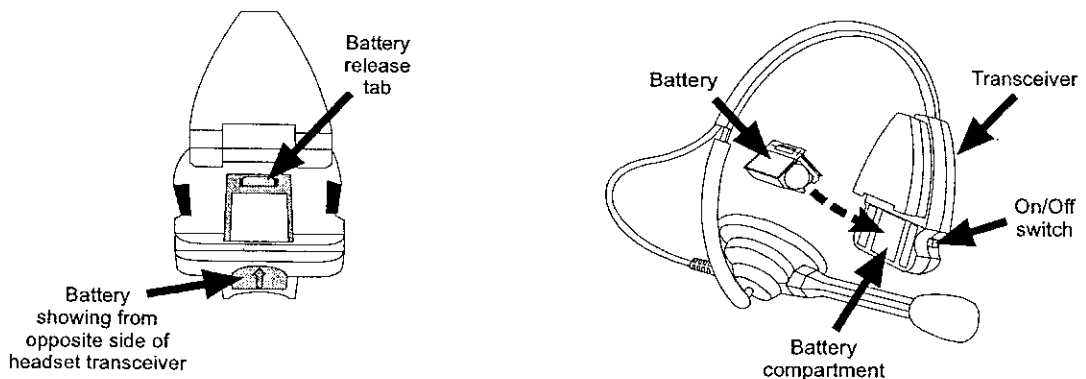
**CAUTION:** To prevent damage, turn Communicator belt-pac unit and HS30 Headset OFF before removing or installing batteries.



**Figure 14. COM430BP battery removal and replacement**

To remove the battery from the belt-pac unit, slide the battery latch open and push the battery in the direction of the large arrow on the battery

Install a fully charged battery in the battery compartment with the arrow on the battery pointing out as shown in Figure 14. Slide it into the tracks on both sides of the compartment until its catch clicks securely in place.



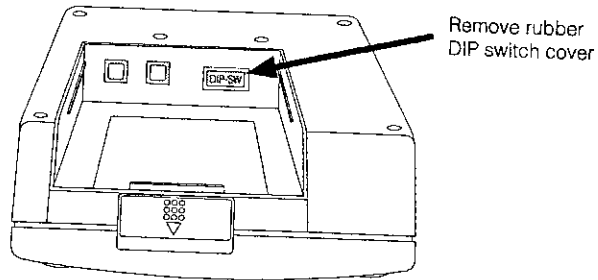
**Figure 15. HS30 Headset battery removal and replacement**

To remove the battery from the HS30 Headset, press on the battery release tab while pushing on the battery from the opposite side of the headset transceiver where the arrow is on the battery.

Install a fully charged battery in the battery compartment until it clicks securely in place as shown in Figure 15.

### COM430BP Frequency Selection Switch Location:

To access the Communicator frequency selection DIP switch, SW1, remove the battery from the Communicator and remove the rubber DIP switch cover shown in Figure 16. Refer to the table on page 3 for DIP switch settings.



**Figure 16. COM430BP Frequency Selection DIP Switch location**

## 1.2.3 Battery Chargers

**IMPORTANT:** Before installing the system, plug the battery charger into an AC electrical outlet, and place all COMMUNICATOR® batteries into it for charging while the system is being installed.

### AC Adapter:

Connect the battery charger cable to the 16.5VAC adapter as shown in Figure 17.

Plug the cable connector into the back of the charger. Plug the adapter into an AC electrical outlet and secure it to the outlet with the grounding screw (if provided). The green and red lights will come on, one at a time, until they are all lit. Then they will go off, one at a time, indicating the charger is ready for use when all the lights are off.

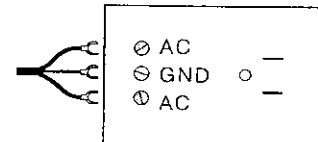


Figure 17.  
16.5VAC adapter  
cable connections

### 230Volt AC Adapter Connections Outside the U.S.A.

- Step 1** Connect an electrical plug to the wires on the power cable according to color codes (**Brown** = live, **Blue** = neutral, **Green with yellow stripes** = ground).
- Step 2** Plug the other end of the power cable into the receptacle on the AC adapter.
- Step 3** Remove the spade lugs from the two "AC" wires of the cable on the back of the battery charger, and cut the "GND" wire as short as possible. The GND wire will not be used. Cut the connector off the AC adapter output cable. Strip enough of the insulation from the wires of both cables so they can be spliced. Splice the wires from the AC adapter cable to the "AC" wires of the battery charger cable. Cover the splice with electrical tape or shrink tubing.

- Step 4** Plug the electrical plug into a wall outlet.

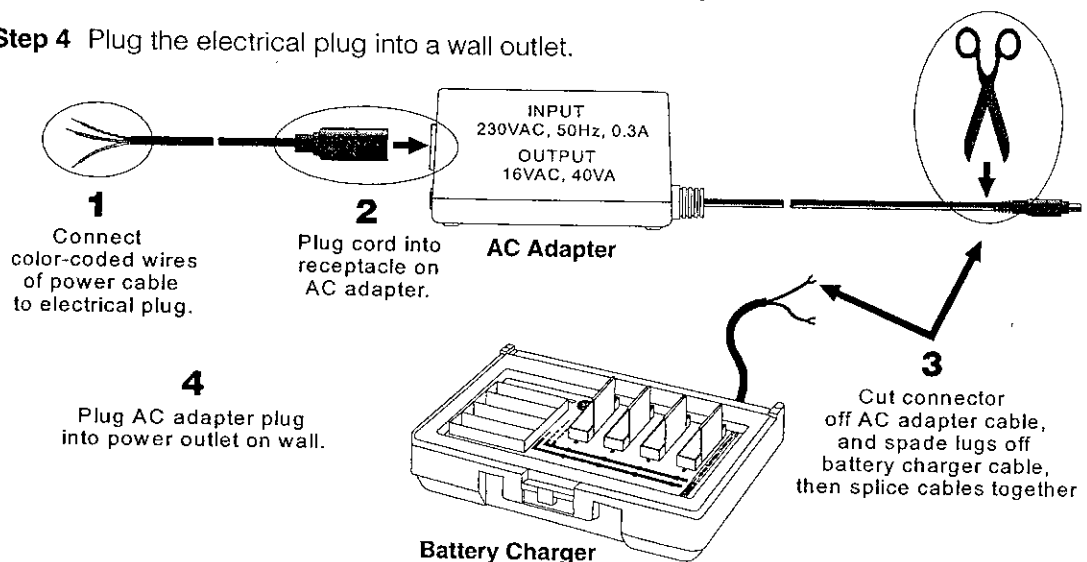


Figure 18. 230VAC power supply wiring for Battery Charger

## 1. AC420

Place up to four batteries in the charger to charge at the same time. A few seconds after each battery is placed in the charger, the red CHARGING light on the panel adjacent to the battery will indicate the battery charging status. See the CHARGING LIGHT STATUS TABLE on page 17 for an explanation of what is happening. When the battery is fully charged, the green READY indicator adjacent to it will light. (Approximately 4 hours) It can then be placed back into a Communicator.

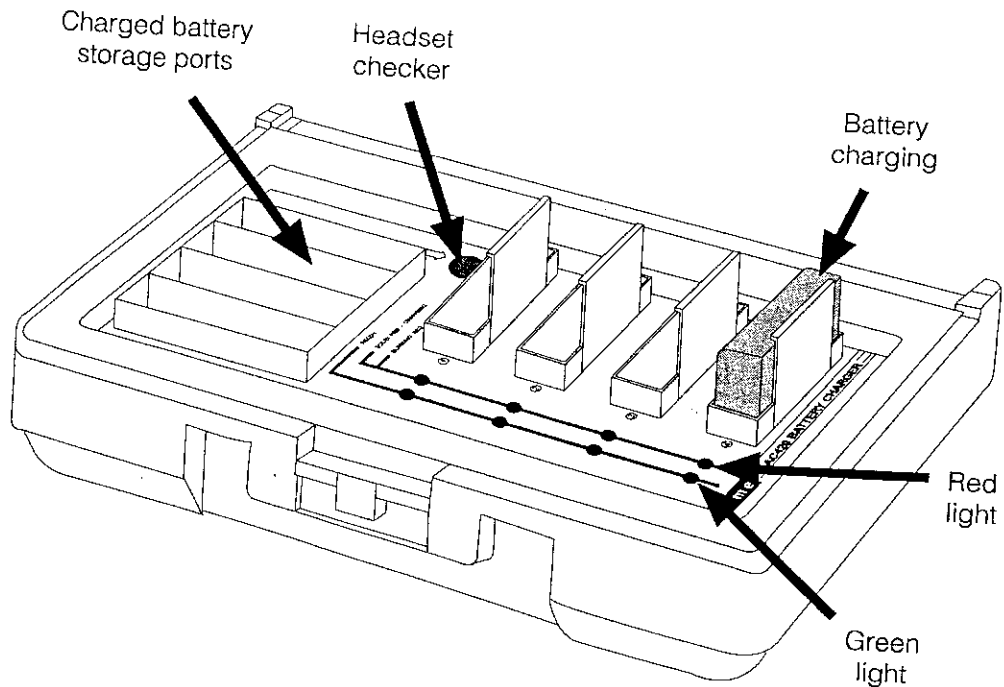


Figure 19. AC420 Battery Charger

**CAUTION:** Do not remove batteries from the charger until the green READY light is lit, or the charger will reset and the charge cycle will begin again.

### Top –

**Red lights** indicate charging status of batteries below the lights, as shown on the Charging Light Status Table on page 17.

**Green lights** indicate batteries below the lights are fully charged and ready for use.

**Headset checker** is used to check headsets for normal operation. Plug the headset cable connector into the headset connector receptacle and speak into the headset microphone. If the headset is operating normally, you will hear your own voice in the earpiece. If the headset is defective, you will hear nothing.

### Back –

**AC adapter cable** is for connecting the AC adapter to the charger.

## 2. AC900

Place up to four COM400CC batteries in the charger for charging at a time. The red Charging light, adjacent to a battery being charged will indicate the battery charging status. See the CHARGING LIGHT STATUS TABLE on page 17 for an explanation of what is happening. When the battery is fully charged, the green READY indicator adjacent to it will light. (Approximately 3 hours) It can then be placed back into the COM400CC.

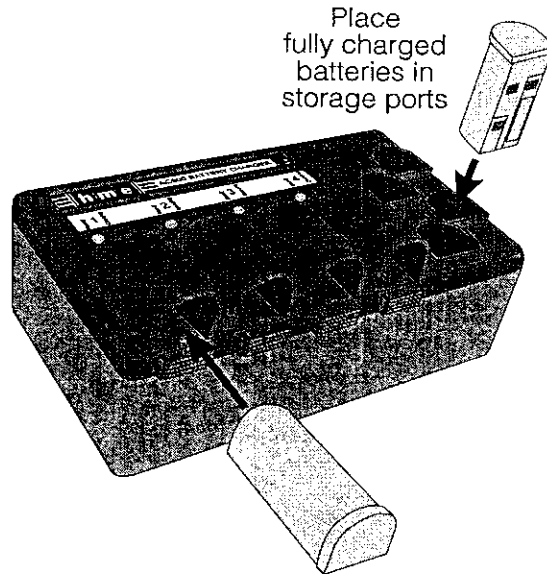


Figure 20. AC900 Battery Charger

The AC900 Battery Charger reads and updates each "smart battery's" history each time it is charged. This information is used to automatically initiate conditioning cycles, which improve the battery's performance and prolong its life. A conditioning cycle consists of a complete discharge before a battery is charged. This happens each time the battery history indicates it has been charged 10 times since the last conditioning cycle. While a battery is discharging, the red Charging light next to it will blink on and off at 2-second intervals. The conditioning cycle takes up to 6 hours.

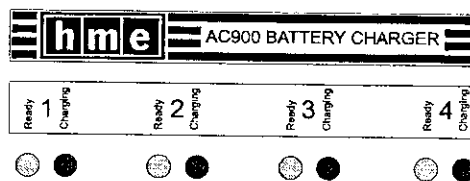


Figure 21. Battery charging indicator lights

When a battery is fully charged and ready for use, its red "Charging" light will go off and the green "Ready" light next to it will go on.

**CAUTION: Do not remove batteries from the charger until the green READY light is lit, or the charger will reset and the charge cycle will begin again.**

To remove a fully charged battery from the battery charger, push the battery from the end near the status lights. Store fully charged batteries in the storage ports on the right side of the charger.

### 3. AC30

Place up to four HS30 batteries in the charger to charge at the same time. A few seconds after each battery is placed in the charger, the red CHARGING light on the panel adjacent to the battery will indicate the battery charging status. See the CHARGING LIGHT STATUS TABLE on page 17 for a detailed explanation of what is happening. When a battery is fully charged, the green READY light on the panel adjacent to it will light. (approximately 2.5 hours) It can then be placed back into a HS30 Headset.

**CAUTION:** Do not remove batteries from the charger until the green READY light is lit, or the charger will re-charge and the charge cycle will begin again.

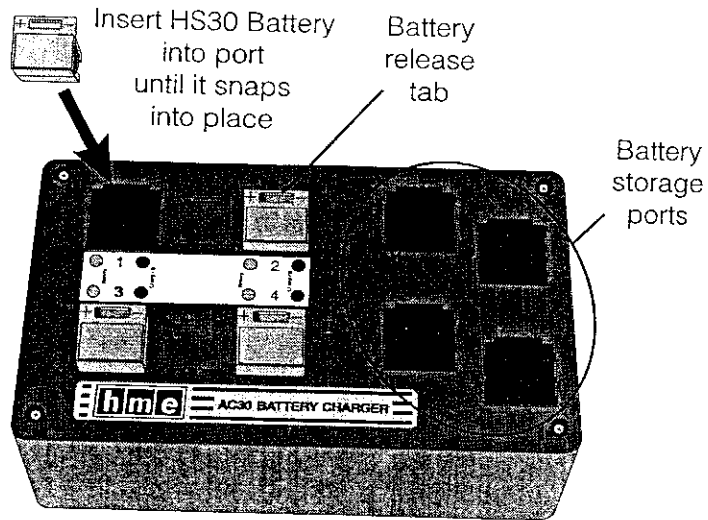


Figure 22. AC30 Battery Charger



#### 4. AC910

Place up to two COM400BP batteries and four COM400CC batteries in the charger to charge at the same time. A few seconds after each battery is placed in the charger, the red CHARGING light on the panel adjacent to the battery, will indicate the battery charging status. See the CHARGING LIGHT STATUS TABLE on page 17 for a detailed explanation of what is happening. When a battery is fully charged, the green READY light on the panel adjacent to it will light. (approximately 4 hours) It can then be placed back into a COMMUNICATOR®.

**CAUTION:** Do not remove batteries from the charger until the green READY light is lit, or the charger will reset and the charge cycle will begin again.

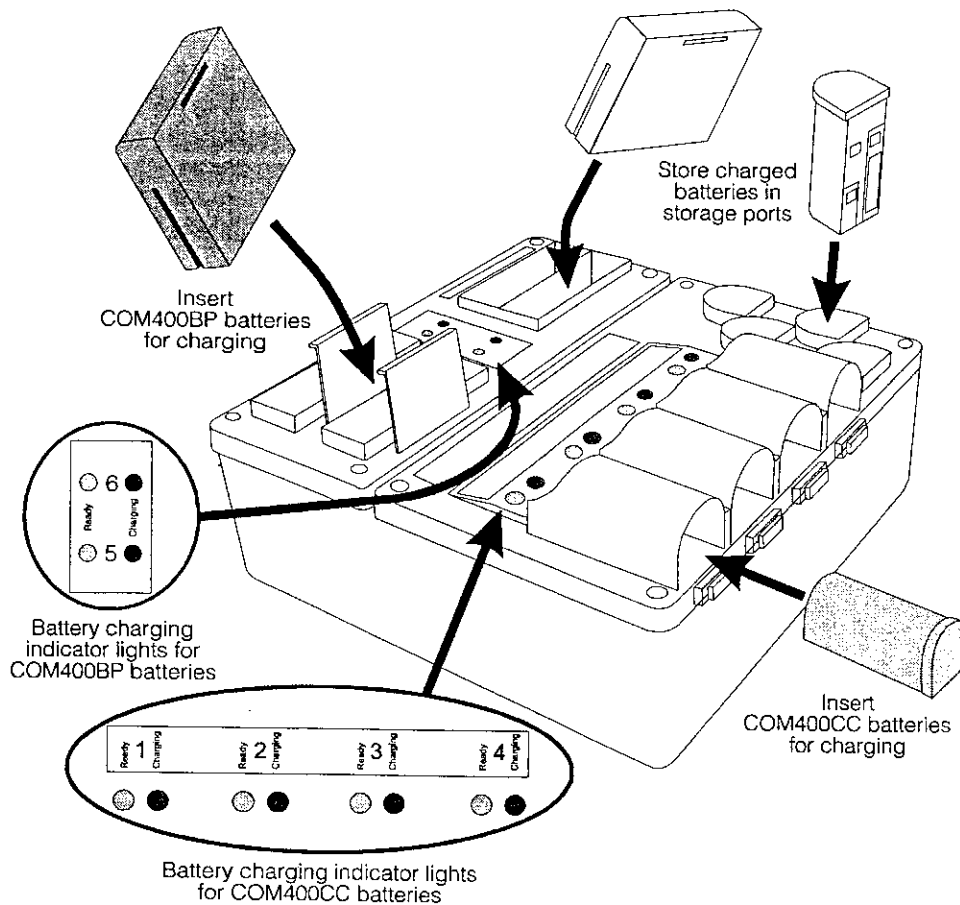


Figure 23. AC910 Battery Charger

## 5. AC930

Place up to two COM430BP batteries and four HS30 batteries in the charger to charge at the same time. A few seconds after each battery is placed in the charger, the red CHARGING light on the panel adjacent to the battery, will indicate the battery charging status. See the CHARGING LIGHT STATUS TABLE on page 17 for a detailed explanation of what is happening. When a battery is fully charged, the green READY light on the panel adjacent to it will light. (approximately 4 hours for COM430BP batteries and 2.5 hours for HS30 batteries) It can then be placed back into a COMMUNICATOR®.

**CAUTION:** Do not remove batteries from the charger until the green READY light is lit, or the charger will reset and the charge cycle will begin again.

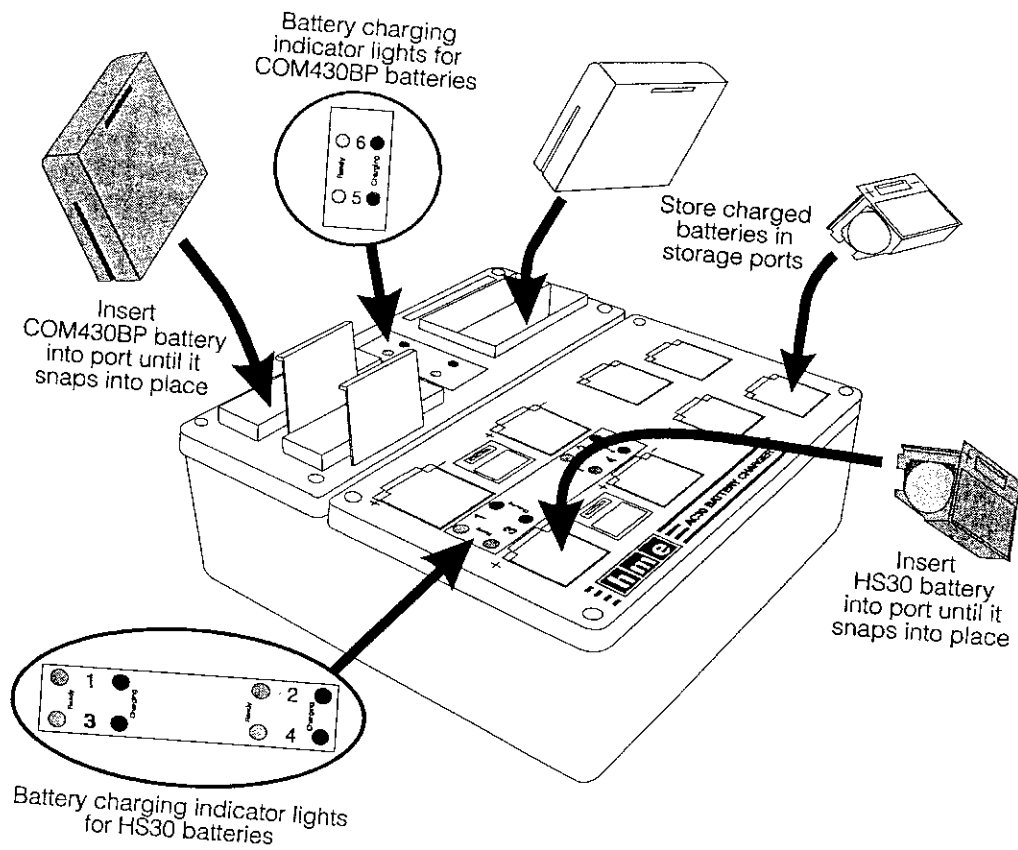


Figure 24. AC930 Battery Charger

## 6. Charging Light Status

Use the following Charging Light Status Table to determine the status of inserted batteries, according to blinking patterns of the adjacent red and green lights.

<b>CHARGING LIGHT STATUS TABLE - WITH BATTERY INSERTED</b>		
<b>CHARGING LIGHT</b>	<b>WHAT IT MEANS</b>	<b>WHAT TO DO</b>
<b>RED</b> - OFF	Charger doesn't see battery	See NOTE.
<b>RED</b> - STEADY ON	Battery is being charged	Wait. Do not remove battery.
<b>RED</b> - blinks 2 seconds ON, 2 seconds OFF	Battery is being discharged	Wait. Do not remove battery.
<b>RED</b> - blinks 2 times quick, 3 seconds OFF	Discharge error	Battery is not discharging properly. See NOTE.
<b>RED</b> - blinks 3 times quick, 3 seconds OFF	Charging error	Battery is not charging properly. See NOTE.
<b>RED</b> - blinks 4 times quick, 2 seconds OFF	Low battery error	See NOTE.
<b>RED</b> - blinks 5 times quick, 2 seconds OFF	Charging error	See NOTE.
<b>GREEN</b> - OFF	Charger doesn't see battery	See NOTE.
<b>GREEN</b> - STEADY ON	Charging complete , battery ready	See NOTE.
<b>GREEN</b> - blinks 2 seconds ON, 2 seconds OFF	Read-write error	See NOTE.
<b>GREEN</b> - blinks 3 times quick, 3 seconds OFF	Memory full	See NOTE.
<b>RED</b> and <b>GREEN</b> blink alternately	Authentication error	See NOTE.
<b>NOTE:</b> Either the battery or the charger has a problem. Mark the battery and retry in a different slot. The battery is faulty if it has the same problem in a different slot AND a known-good battery passes in the same slots. The charger circuitry is faulty if a known-good battery fails in the same slots.		

## 1.3 OPTIONAL EQUIPMENT

Equipment	Model Number
COMMUNICATOR®	COM400BP
COMMUNICATOR®	COM400CC
COMMUNICATOR®	COM430BP
Battery (NiCd) for COM400 or COM430BP COMMUNICATOR®	BAT400
Battery (NiMH) for HS30 Headset	BAT30
Battery (NiCd) for COM400CC	BAT900
Earpiece/Microphone	HS4
Headset for COM400BP	HS9-90
Headset for COM400CC	HS9LT
Headset for COM430BP	HS30
Headset Earmuff	no model number
Ceiling Speaker	MM100
Ultrasonic Vehicle Detector	DU3
Vehicle Detector Board	VDB101A
Vehicle Detector Loop (underground)	VDL100
Message Repeater	MR300
Remote Display	R30
Low-Profile Speaker with Volume Adjustment	MM2500
Microphone	DM1
Speaker	SP2000A
Mode Switch (dual tone)	MS1000

## 1.4 FCC NOTICE

HME wireless radio frequency systems are type-accepted in the United States under Part 90 of the Federal Communications Commission (FCC) Code of Federal Regulations, and type-approved in Canada by Industry and Science Canada. Because licensing depends on the system's application, it is the user's responsibility to apply for a license from the FCC in the U.S. and its possessions, or from Industry and Science Canada in Canada and its territories. Licensing requirements vary from country to country. Contact your local licensing agency for specific requirements.

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, and (2) This device must accept any interference received, including interference that may cause undesired operation.

**NOTE:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communication. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Changes or modifications not expressly approved by HM Electronics, Inc. could void the users authority to operate this equipment.

## SECTION 2. SYSTEM INSTALLATION

### 2.1 INTERFERENCE PREVENTION

**CAUTION:** *Interference may occur if the audio system is not properly installed.*

The following types of interference could occur if precautions are not taken in installation of the system. Read this section carefully before proceeding with the installation.

#### 2.1.1 Radio Frequency (RF) Interference

Resolving the cause of RF interference is difficult and time-consuming. The following precautions will help avoid the most common RF interference problems.

- Find the best base station/antenna location before mounting it permanently.
- Solder all joints (including crimp joints) at the speaker location. This is especially important in damp climates
- Be certain all joints and connections are tight.
- Avoid leaving long lengths of unshielded wire anywhere in the audio system.
- Ground the shield of the outgoing speaker cable. In severe cases of interference, grounding the shield at the speaker may help.

AM broadcast and FM radio frequency interference may cause similar problems but require different corrective action. AM interference symptoms may appear to be less severe at certain times of day, since a 50% reduction of transmitter output power at dusk (5-7 PM) is required in some areas for AM radio stations rated at or above 100kW. Note the following symptoms carefully to determine the possible cause of interference. Call HME at 1-800-848-4468 if assistance is required.

##### **AM Interference:**

Static or hum may be heard in the COMMUNICATOR® headset when the system is active. The point of entry of the AM interference is at the outside speaker/ microphone via the cables connected to the base station. In order to block out the AM signal, first locate and identify any AM station in the area, and find out its operating frequency and transmitter output power. The system can then be modified with a network of inductors and capacitors that will trap the undesirable AM signal at the point of entry into the system. Static, hum and/or voice may be heard in the Communicator headset when the system is active or when transmitting in either channel A or B. The point of entry for the interference can be at three different locations: the outside speaker cables, the Communicator receiver, and the base station transmitter. The AM station frequency may completely suppress or overpower the audio system's transmitter signal, depending on the operating frequency, transmitter tower location and output power of the AM radio station. A change of the system operating frequency may be necessary.

##### **FM Interference:**

A common symptom of FM interference is the presence of voices from outside the system in the Communicator headset when transmitting on either channel A or B, or when the system is active. Changing frequencies on the Communicators and base station may alleviate the interference.

## 2.1.2 Electrical Interference

The effect of electrical faults in appliances and other electrical equipment can make operation of a wireless system ineffective in communicating with customers. The most common symptoms are static, hum, crackling, buzzing and zip sounds in the headset of the COMMUNICATOR® when the system is active. Interference caused by electrical faults in lighting systems might not be noticed immediately, since most lighting systems are controlled by a timer or light-sensing device.

- **Faulty Wiring or Components**

Faulty components or electrical wiring in menu boards or speaker posts can cause symptoms identical to those caused by AM interference. Remove power to the menu board or speakerpost at the circuit breaker until proper repair of the electrical system can be made.

- **Improper Earth Grounds**

Improper earth grounds throughout the building can result in random buzzing and zips in the Communicator when operating in either channel A or B. Placing a surge protector between the base station AC adapter and the AC electrical outlet will eliminate the problem in most cases.

## 2.2 PREPARATION FOR INSTALLATION

Approximately 3 hours is required for installation of the System 400.

Before installing the system, coordinate the time of installation with the store owner/manager to minimize disruption of business.

Be certain the site has been properly prepared according to the following guidelines.

- Electrical power must be connected and available.
- Some type of compatible vehicle detector loop or other vehicle detector system must already have been installed in the drive-thru lane(s).

### 2.2.1 Tools Required

- Phillips (cross-point) screwdriver, size #2
- standard (slotted) screwdriver, 1/8 inch (4 mm)
- power drill and drill-bit set
- fish tape, 100 feet (30 meter)
- wire cutter / stripper
- soldering iron
- rosin-core solder
- electrical tape

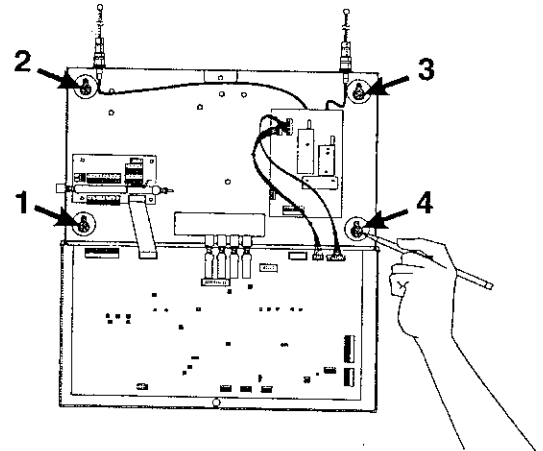
## 2.3 INSTALLATION PROCEDURE

### 2.3.1 Base Station Installation

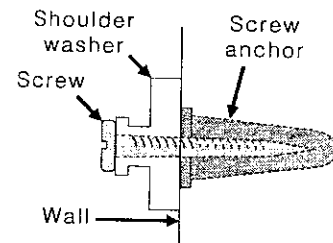
Discuss the location of the base station with the store owner or manager. It should be mounted with the bottom of the cabinet no more than 5 feet (1.52 meters) above the floor, away from grease and large metal objects. It must be near enough to an available AC electrical outlet to reach the outlet with the 10 foot (3 meter) AC power adapter cord, or the cord will need to be extended. It must be near enough to the pull box to be reached by the cables which will be pulled into the building through the outer wall.

**NOTE:** For dual drive-thru installations, follow the instructions below to install two base stations near each other. The two base stations **must not** be mounted closer than 3 feet (.91 meter) from each other. Interconnect the J9 connectors, #s 1, 2 and 3 as shown on pages 33 and 34. Cable pulling and installation of an outside speaker and microphone for each lane will also be done according to the following instructions.

- Connect the base station power cable to the 16.5VAC adapter as shown in Figure 17, page 11. For use outside the United States, see 230VAC adapter connections shown in Figure 18, page 11.
- Connect the base station 16.5VAC adapter cord to J2 pins 1 and 2 at the top, left corner of the audio (largest) circuit board, inside the base station. Plug the adapter into the electrical outlet nearest the desired base-station mounting location.
- Walk test transmission and reception with a COMMUNICATOR® (using a fully charged battery) around the area where the Communicators will be used. Also, walk past the menu board to test reception when using speed-team operation. Speak into the headset microphone and listen to your own voice (sidetone) in the headset. Continue doing this with the base station in various locations until the best possible transmission/reception is found. When you have determined the best location, unplug the AC adapter and mount the base station on the wall as follows.
- Hold the base station, with its door open, against the wall at the desired mounting location, and mark the wall through the four screw-holes on the back of the cabinet as shown in Figure 25.
- Remove the base station from the wall and drill four  $\frac{3}{16}$  inch (4.76mm) holes in the wall at the marked spots.
- Insert the enclosed #6 screw anchors into the holes.
- Insert the four enclosed screws through the enclosed shoulder washers, and screw them into the anchors as shown in Figure 26.
- Position the four screw holes in the back of the base station over the shoulder washers, and slide the base station downward to secure it in place.



**Figure 25.**  
Mark the wall through the four screw holes on the back of the base station cabinet.



**Figure 26.**  
Screw anchor with screw and shoulder washer in wall

## 2.3.2 Cable Pulling

**CAUTION:** *If not using the HME Audio Cable, be certain the speaker/microphone wires are a twisted pair. For full-duplex installations, the speakers and microphones must use separate cables or audio feedback will occur.*

**Never run high-voltage cables in the same conduit with audio or loop cables.**

The recommended HME cable contains four color-coded, insulated wires and a bare shield (drain) wire. This cable can be used to connect any System 400 component to the base station.

Pull the cables (two for full-duplex one for half-duplex) through the underground conduit from the outside speaker post or menu board into the building as follows.

**NOTE:** For dual drive-thru installations, repeat the following steps to route cable from inside the building to the speaker post or menu board in each drive-thru lane.

- Run fish tape from inside the building, through the conduit to the speaker post or menu board.
- Go outside. If more than one cable are being pulled, **mark the cables and spools for identification**. Fasten each cable to the fish tape where it comes out of the conduit, and return to the customer-service area inside the building.
- Pull the fish tape and cable through the conduit, into the building. As the cable comes through the conduit, disconnect it from the fish tape and continue pulling enough of it through the conduit to reach the base station.
- Return to the outside customer-service area, and route the cable from the outside conduit to the speaker and microphone units in the speaker post or menu board.
- Cut the cable, leaving approximately 3 feet (915 mm) of slack. If more than one cable have been pulled, **mark the ends of the cables again for identification**.
- Remove approximately 2 inches (50 mm) of the outer insulation from the end of each cable. Strip approximately ½ inch (12 mm) of insulation from each of the four wires in the cable.
- When all cables have been pulled from outside into the building, gather the cables inside the building and route them together to the base station, through walls and over ceiling panels if possible.



### 2.3.3 Outside Speaker and Microphone Installation and Cable Connections

This section describes standard, full-duplex installations, using the DM2 Microphone and the SP2500LP Low-Profile Speaker. Specific installation requirements may vary.

If the DM1 Microphone will be used, see DM1 installation instructions in Appendix E.

Refer to the wiring diagrams on pages 33 and 34 for cable connections.

**NOTE:** For half-duplex installations, see Appendix D for installation of the SP2000A Speaker/Microphone Unit. The SP2000A is used as the speaker and microphone in half-duplex installations.

In order to avoid audio feedback, the speaker unit must be mounted at least 2 feet (610 mm) from the microphone unit. Positioning of the two units is critical.

The microphone unit must be mounted inside the speaker post or menu board, against the speaker grill. It should be installed first, so it can be positioned where the customer will be speaking directly into it. The speaker unit can then be installed anywhere around the microphone unit, as long as they are at least 2 feet (610 mm) apart, center-to-center. This distance may vary according to specific conditions.

**NOTE:** Try the system with the speaker unit at various locations before permanently mounting it. If it is not positioned correctly, feedback may occur. If this happens, reposition the speaker at other locations around the microphone unit until the feedback disappears. If possible, park a vehicle in front of the post to simulate echo conditions that may also cause feedback.

#### 1. Installing the DM2 Microphone

Typical DM2 Microphone installation involves mounting the unit with the enclosed foam pieces, inside the upper compartment of the speaker post. The foam will fit many types of speaker posts and menu boards. If the DM2 must be mounted in a small area, compress the foam when installing it and closing the speaker post or menu board. In larger areas, additional foam (not supplied) must be added. To install the DM2 in a typical speaker post, follow the instructions on page 24 and refer to Figure 28. Installation in a menu board will be similar, within the menu-board speaker compartment.

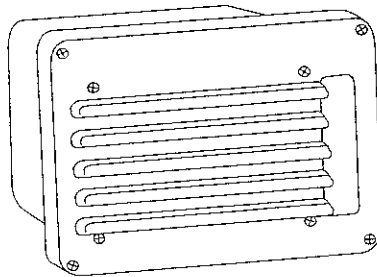
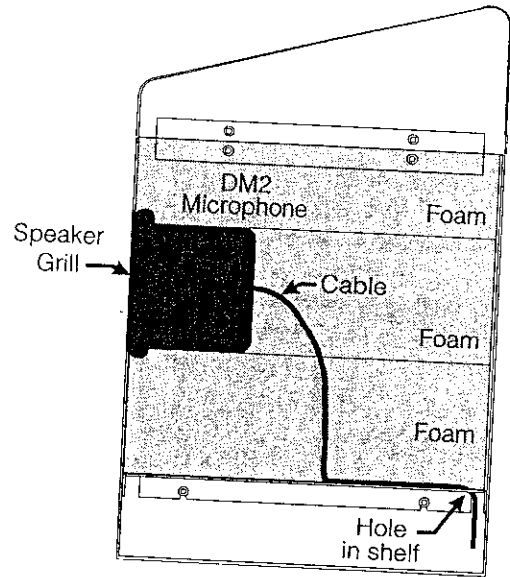


Figure 27. DM2 Microphone

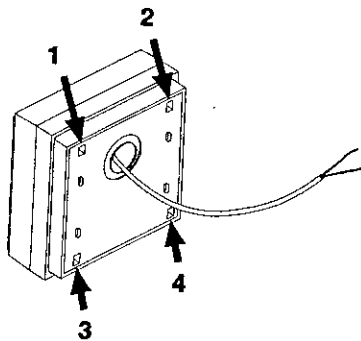
- Open the speaker post and remove any existing equipment, foam or debris. If there is an existing microphone, remove it and disconnect the microphone cable from it.
- Splice the wires of the microphone cable (new or existing) from the audio system to the wires of the cable extending from the DM2, according to the audio system wiring diagram.
- Place the front of the DM2 microphone unit centered, flush against the speaker grill.
- **For optimum performance, the DM2 must be mounted flush and tight against the speaker grill.**  
Pack the remaining enclosed pieces of foam around the top and bottom of the DM2, and in back of it, so the unit will be held securely in place against the speaker grill when the compartment is closed. If required, add extra foam (not supplied) on the sides of the DM2, to fill the enclosure.
- Close the speaker post.



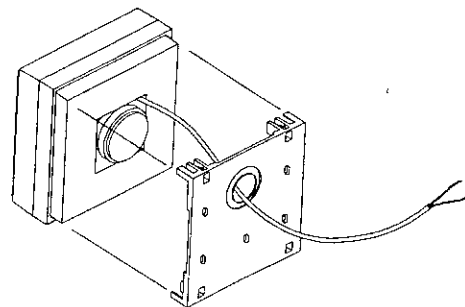
**Figure 28.**  
DM2 and foam inserts shown in typical SPP2 speaker post installation

## 2. Installing the SP2500LP Low-Profile Speaker

Use a flat blade screwdriver, or similar tool, to open the SP2500LP speaker by prying the rear panel away from the speaker box at the four points shown in Figure 29. Remove the rear panel from the speaker box as shown in Figure 30.



**Figure 29.**  
Pry rear panel away from speaker box at the four points shown



**Figure 30.**  
Remove rear panel from speaker box

Keep in mind that the SP2500LP must be mounted at least 2 feet (610 mm) from the microphone, center-to-center.

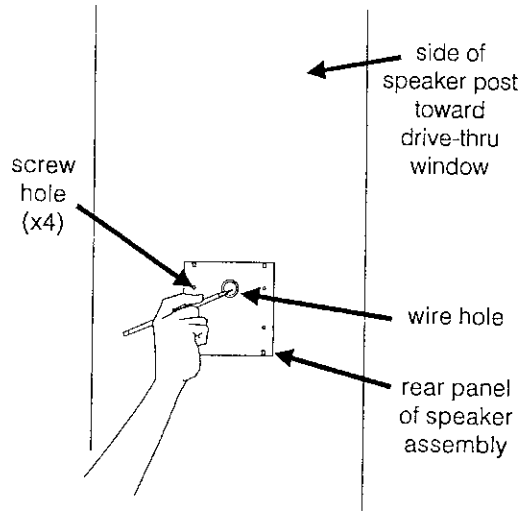
Hold the rear panel of the SP2500LP flat against the surface of the speaker post or menu board, at the desired mounting location, as shown in Figure 31. Use a pencil to mark the speaker post through the wire hole in the panel. Remove the panel and set it aside. Drill a 1/4 inch (6 mm) wire hole at the marked location.

Hold the rear panel against the surface, in the same position as before, and screw the four enclosed self-tapping screws through each of the screw holes on the panel, into the speaker post or menu board as shown in Figure 32.

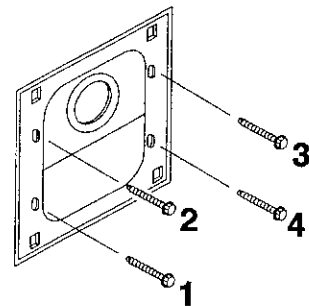
Route the cable from the back of the speaker through the wire hole in the rear panel of the speaker assembly, into the speaker post. Close the speaker assembly box by pressing it tightly against the rear panel.

#### SP2500LP Cable Connections:

Inside the speaker post or menu board, connect the green and white wires of the appropriate cable to the wires coming from the speaker as shown in Figure 33. Do not connect the drain wire. Solder the connection and cover it with electrical tape or shrink tubing.

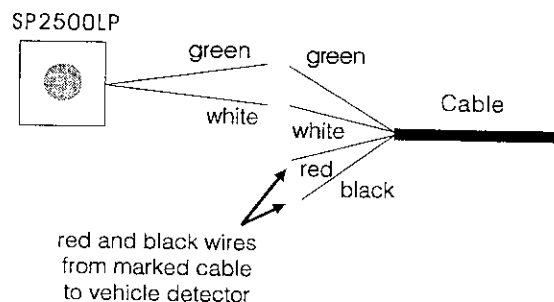


**Figure 31.**  
Mark speaker post or menu board through wire hole in rear panel of SP2500LP speaker assembly



**Figure 32.**  
Screw the self-tapping screws through holes in rear panel of SP2500LP speaker assembly

**IMPORTANT:** For full-duplex systems, use separate cables for speaker and microphone, or feedback may occur.



**Figure 33.** SP2500LP cable connections

### 2.3.4 Optional Vehicle Detector Installation

If a loop-type vehicle detector will be used, it should already be installed. If another type vehicle detector needs to be installed, install it according to its own installation instructions. Connect the vehicle detector to the base station according to the appropriate wiring diagram on pages 33 and 34. Note that the connections are different for internal and external type vehicle detectors.

- If an **internal vehicle detector** is used, route a cable from the underground loop to the terminal block on the Vehicle Detector Board.
- If an **external vehicle detector** is used, route a cable from its output to the J3 connector on the switcher circuit board in the System 400 base station.
- Remove 4 inches (100 mm) of outer insulation from the end of the cable at the base station, and strip approximately ¼ inch (6 mm) of insulation from each of the color coded wires coming from the cables.
- Connect the color-coded wires to connector J3, pins 4 and 5 on the switcher circuit board for negative vehicle detection, or pins 3 and 4 for positive vehicle detection according to the appropriate wiring diagram on pages 33 and 34. Be certain the wires are fully inserted into each connector plug to prevent shorting the wires.

### 2.3.5 Optional HME Vehicle Detector Board (VDB) Installation

To install an HME VDB in the base station, refer to the illustrations in Figures 35 and 36, and follow the instructions below.

- Open the base station by pulling the latch on the front cover and VERY CAREFULLY guiding the cover downward.
- Carefully position the three holes in the VDB over the three plastic standoffs at the upper left side, inside the base station. Press on the VDB until the tips of the three standoffs snap through the holes in the board.
- Connect the cable assembly enclosed with the VDB to the P1 connector on the vehicle detector board, and the other end to the J6 connector near the upper, right corner of the switcher board.
- Close the cover on the base station, and lock it by pushing in on the latch.

### 2.3.6 R30 Remote Display Setup

One or more R30 Remote Displays can be used with the System 400. A remote display shows time the current car has spent at the menu board, speaker post or service window. It begins counting when the car arrives and stops when the car leaves.

To install a remote display, refer to the installation instructions provided with the unit. Cable connections should be in accordance with the appropriate wiring diagram on pages 33 and 34, and DIP switch settings according to the wiring diagram and the tables on page 35.

### 2.3.7 External Message Repeater Installation

If an external message repeater is used, it must be wired in series with the outside speaker. It also requires a vehicle-present signal. Connect the message repeater vehicle-present input in to the isolated vehicle detector output on the Audio Circuit Board.

**NOTE:** No output vehicle detect will be generated if the base station power is removed.

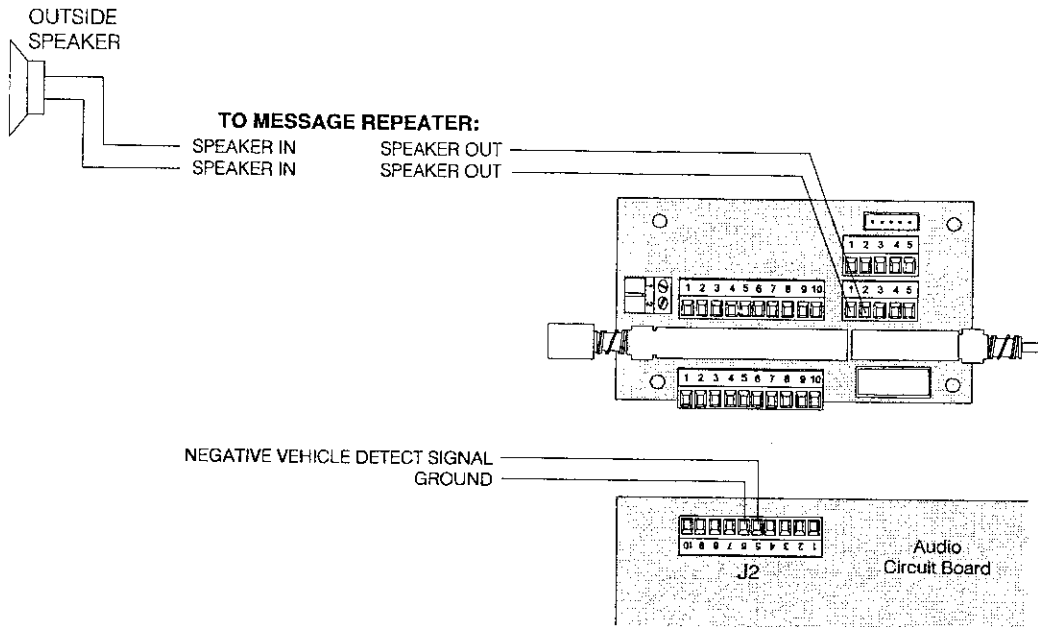


Figure 34. External message repeater connections

### 2.3.8 Alert Tone or Message Setup

If a System 30 Timer (or other external device) is set up with the System 400, an alert tone (triple beep) or a message can be set up to be heard in the Communicator headset or elsewhere through a speaker.

To set up the alert tone or message, first activate the System 30 Timer alarm. Then locate the S8 DIP switch near the bottom center of the 400 base station circuit board. For an alert tone, set switch #5 to OFF. For a message to be activated, set switch #5 to ON. The alert from the System 30 should be wired into J9, pins 7 and 8 on the Audio Circuit Board.

**NOTE:** When the S8 #5 switch is set to OFF, the outgoing message will be activated by a vehicle-present signal at the menu board or speaker post, and the System 30 alert signal will activate three tones in the headset. When the S8 #5 switch is set to ON, the System 30 alert signal will activate the message. The three alert tones will no longer sound, and the message will no longer be activated by the vehicle-present signal. When using the "Alert In," a positive voltage must be used.

### 2.3.9 Early Warning Setup

An extra vehicle detector can be used with the System 400 to give a pre-warning signal when a vehicle is entering the drive-thru area.

To set up an early warning signal, first install the extra vehicle detector at the desired detection point, then connect its cable to connector J9, positions 4 and 5 on the base station circuit board.

## SECTION 3. SYSTEM FUNCTIONAL CHECK AND OPERATION

### 3.1 FUNCTIONAL CHECK

Plug base station AC adapter into electrical outlet.	System power is on. System is silent. Base station POWER light comes on.
Go outside (or have someone else go outside) and follow the steps below.	
Push button "A" and talk into headset microphone.	Audio should be heard at outside speaker.
Release button "A". Place vehicle detector reset switch in <b>VERRIDE</b> position. Tap on outside microphone.	Vehicle present tone should be heard in headset, followed by nbound audio. If this does not happen, there is a wiring problem.

### 3.2 OPERATION

In single or dual drive-thru operations, COMMUNICATOR® button "A" is for communication with the customer, and button "B" is for communication with other crew members wearing Communicators. In dual drive-thru operations, the Communicator "C" button is used to change lanes. Button "C" has no function in single drive-thru operations.

#### 3.2.1 Single Drive-Thru Lane, Full-Duplex Operation

<b>ACTION</b>	<b>RESULT</b>
<p><b>If you are using the Communicator latching feature:</b> Press and release button "A" to latch communication channel open for speaking and listening to customer. The channel will unlatch, ending communication with the customer, if:</p> <ol style="list-style-type: none"> <li>1. you press and release button "A" again, or</li> <li>2. you press button "B," or</li> <li>3. the customer drives away</li> </ol> <p><b>If you are not using the Communicator latching feature:</b> Press and hold button "A" while speaking and listening to customer. Release when transaction is completed.</p>	Customer hears your voice and you hear customer's voice (two-way conversation). Everyone wearing a Communicator will hear the conversation.
While customer is speaking, press the up ▲ or down ▼ arrow to adjust volume level.	Beep tones of increasing/decreasing frequency are heard in headset as volume increases/ decreases. Customer's voice becomes louder or softer.
Press and hold button "B" to speak to other crew members wearing Communicators. Release to listen.	Other personnel wearing Communicators hear your voice in their headsets.

#### 3.2.2 Single Drive-Thru Lane, Half-Duplex Operation

<b>ACTION</b>	<b>RESULT</b>
Press and hold button "A" while speaking to customer.	Customer hears your voice. Everyone wearing a Communicator hears the communication.
Release button "A" and listen to customer.	Customer's voice is heard in headsets of everyone wearing Communicators.
While customer is speaking, press the up▲ or down▼ arrow to adjust volume level.	Beep tones of increasing/decreasing frequency are heard in headset as volume increases/decreases. Customer's voice becomes louder or softer.
Press and hold button "B" to speak to other crew members wearing COMMUNICATOR®s. Release to listen.	Other personnel wearing Communicators hear your voice in their headsets.

### 3.2.3 Dual Drive-Thru, Full-Duplex Operation

ACTION	RESULT
<p><b>If you are using the Communicator latching feature:</b>            Press and release button "A" to latch communication Channel 1 open for speaking and listening to customer in Lane 1. The channel will unlatch, ending communication with the customer, if;</p> <ol style="list-style-type: none"> <li>1. you press and release button "A" again, or</li> <li>2. you press button "B," or</li> <li>3. you press button "C," or</li> <li>4. the customer drives away</li> </ol> <p><b>If you are not using the Communicator latching feature:</b>            Press and hold button "A" while speaking and listening to customer in the current lane. Release when transaction is completed.</p>	<p>Customer hears your voice and you hear customer's voice (two-way conversation). Everyone wearing Communicators set to the same channel hears the communication.</p> <p><b>NOTE:</b> When transmitting in Lane 1 operation, the Communicator power light will blink rapidly. When transmitting in Lane 2 operation, the Communicator power light will blink rapidly 4 times, then pause and repeat. Lanes 1 and 2 have different sounding vehicle-present tones.</p>
<p>While customer is speaking, press the up▲ or down▼ arrow to adjust volume level.</p>	<p>Beep tones of increasing/decreasing frequency are heard in headset as volume increases/ decreases. Customer's voice becomes louder or softer.</p>
<p>Press button "C" to switch to other lane.</p>	<p>You hear customer's voice from other lane.</p>
<p>Press and hold button "B" to speak to other crew members wearing Communicators. Release to listen.</p>	<p>Other personnel wearing Communicators hear your voice in their headsets.</p>

### 3.2.4 Dual Drive-Thru, Half-Duplex Operation

ACTION	RESULT
<p>Press and hold button "A" while speaking to customer in the current lane.</p>	<p>Customer hears your voice. Everyone wearing Communicators hears the communication.</p>
<p>Release button and listen to customer.</p>	<p>Customer's voice is heard in headsets of everyone wearing Communicators.</p>
<p>While customer is speaking, press the up▲ or down▼ arrow to adjust volume level.</p>	<p>Beep tones of increasing/decreasing frequency are heard in headset as volume increases/decreases. Customer's voice becomes louder or softer.</p>
<p>Press button "C" to switch to other lane.</p>	<p>You hear customer's voice from other lane.</p>
<p>Press and hold button "B" to speak to other crew members wearing Communicators. Release to listen.</p>	<p>Other personnel wearing Communicators hear your voice in their headsets.</p>

### 3.2.5 Noise Cancellation (Reduction) Adjustment

The noise reduction feature of the System 400 provides four levels of noise reduction. This adjustment should be made for the best balance of noise reduction and voice quality possible, considering the store's environment.

Locate the J17 jumper near the lower-left corner of the main base station circuit board. Check the inbound background noise levels and voice quality with the jumper in all four positions until the desired noise level and voice quality are attained.

- Set the J17 jumper in the far-right position for maximum noise reduction. With the jumper in this position, background noise will be reduced as much as possible but voice quality will be compromised.
- Set the J17 jumper in the far-left position for minimum noise reduction. With the jumper in this position, voice quality will not be compromised but more background noise will be present.

### 3.2.6 Message Repeater Operation

To record messages for the Message Repeater, press the MESSAGE REPEATER button IN on the System 400 Base Station and do the following:

	<b>ACTION</b>	<b>RESULT</b>
<b>To record Message #1</b>	Press and release the RECORD MODE button <b>once</b> on the System 400 base station.	The <b>red</b> MESSAGE RECORD light on the System 400 base station will come on.
	Press and hold button "B" on the COMMUNICATOR® and talk into the headset microphone to record a message.	The MESSAGE RECORD light on the System 400 base station will begin blinking.
	Release button "B."	The record function will stop and the MESSAGE RECORD light will go off.
<b>To record Message #2</b>	Press and release the RECORD MODE button <b>twice</b> on the System 400 base station.	The <b>green</b> MESSAGE RECORD light on the System 400 base station will come on.
	Press and hold button "B" on the Communicator and talk into the headset microphone to record a message.	The MESSAGE RECORD light on the System 400 base station will begin blinking.
	Release button "B."	The record function will stop and the MESSAGE RECORD light will go off.

**NOTES:**

**Message #1:**

1. will be triggered by a vehicle present signal if S8 switch 5 is OFF. The playing message can be cancelled by pressing the "A" button on the Communicator.
2. will be triggered by an alert signal if S8 switch 5 is ON.
3. will be played to the locations selected on S8 switches 2, 3 and 4. See page 35.

**Message #2:**

1. will be triggered by a vehicle present signal if S10 switch 5 is OFF. The playing message can be cancelled by pressing the "A" button on the Communicator.
2. will be triggered by an alert signal if S10 switch 5 is ON.
3. will be played to the locations selected on S10 switches 2, 3 and 4. See page 35.

**If S8 switch 5 and S10 switch 5 are both set to ON or OFF, Message #1 and Message #2 will be played alternately.**

**After a new message has been recorded or after the base station has lost and regained power, any message to the menu board will always be heard in the Communicator headset the first three times it plays.**

### 3.2.7 Speed-Team Operation

Speed team operation is used during high-volume times. An order taker wearing a belt-pac relays orders from outside into the store using the "B" channel on the Communicator. Placing the speed-team switch in the ON position will disable the speaker and microphone in the speaker post or menu board, and disable the vehicle-alert tone.



### 3.3 IN CASE OF PROBLEMS (Refer to circuit board illustrations on pages 33-37.)

PROBLEM	PROBABLE CAUSE	SOLUTION	
No sound in headset when you press COMMUNICATOR® button "A" and speak into headset microphone.	Power is off at base station.	Check circuit breaker for building.	
	Power supply in base station is not working.	Check power supply indicator lights on base station. If any light is not lit, be certain AC power adapter is plugged into AC electrical outlet, and is connected to J4 connector on audio circuit board in base station.	
	Communicator not turned on.	Turn Communicator on by pushing ON/OFF button. Be certain light goes on.	
	Volume not set correctly.	Push volume-control buttons to adjust volume.	
	Headset connector not plugged firmly into Communicator.	Plug headset connector firmly into Communicator receptacle.	
	Headset defective.	Replace with another headset.	
	Low or dead battery.	Check ON/POWER light. If not lit, replace battery.	
	Communicator failed.	Use another Communicator. Call HME. *	
	<b>COM430 Only</b>	HS30 Headset not turned on.	Press ON/Off switch to turn headset on.
		HS30 Headset battery is low or dead.	Replace battery.
Communicator channel "A" or "B" functions not working.	Communicator not turned ON.	Turn on Communicator.	
	Dead or weak battery.	Replace battery.	
	Communicator or base station failure. Channel "A" or "B" light on base station does not light when Communicator button "A" or "B" is pressed.	Use another Communicator. Call HME. *	
	Wrong frequency settings.	Check frequency settings in tables on pages 3 and 35.	
"C" button does not switch between channels in a dual-lane drive-thru.	Switch setting on Communicator incorrect.	Check S1 switch. Switch #9 should be ON.	
Outbound sound too low.	Outbound volume set too low for environment.	Turn outside speaker volume control clockwise with small standard (slotted) screwdriver until level is satisfactory.	
No outbound sound; customer cannot hear anything.	System may be set for speed-team operation.	Be certain SPEED TEAM button on base station is out (OFF).	
	Loose wires on base station circuit board.	Check speaker wire connections in base station.	
	Defective speaker or base station.	Call HME. *	
No inbound audio from customer (in half-duplex operation)	System may be set for speed-team operation.	Be certain SPEED TEAM button on base station is out (OFF).	
	Base station may be set for wrong drive-thru mode (full or half-duplex).	Check S6 switch on base station circuit board. Switch #1 should be ON for full-duplex OFF for half-duplex	

\* For assistance, call HME at 1-800-848-4468, or Fax 858-552-0172.

PROBLEM	PROBABLE CAUSE	SOLUTION
Personnel hear static only in headsets.	Transmitter antenna connection on base station is loose.	Tighten transmitter antenna connection.
	No power to base station.	Check base station power adapter connections.
	Circuit board defective.	Call HME. *
<b>COM430 Only</b>	Interference from nearby equipment.	Person wearing Communicator should move to different location.
	Belt-pac and/or headset not worn properly.	Be certain belt-pac is securely clipped onto belt or waistband, close to body, and both belt-pac unit and headset are in upright positions.
Personnel hear customer in headsets or ceiling speaker, but cannot hear each other.	Receiver antenna connection on base station is loose.	Tighten receiver antenna connection (on top, right of base station).
	Status lights are not lit. Circuit board is defective.	Call HME. *
	Defective COMMUNICATOR® or headset.	Call HME. *
No tone or sound in headset or ceiling speaker when vehicle drives into drive-thru lane.	Power interruption has caused vehicle detection circuit to be out of balance.	When no vehicle is in the drive-thru lane, press vehicle detector override switch on base station to RESET position, then back to NORMAL position.
	System may be set for speed-team operation.	Be certain SPEED TEAM button on base station is out (OFF).
	Connector may be loose.	Check connectors. Call HME. *
Personnel cannot hear outside customers in headset or ceiling speaker.	Loose wires on base station circuit board connector.	Be certain wires in base station are securely connected.
	System may be set for speed-team operation.	Be certain SPEED TEAM button on base station is out (OFF).
	Outside speaker or audio circuit board has failed.	Call HME. *
Communicator has intermittent sound.	Low battery.	Replace battery.
	Defective headset cable.	Use another headset. Call HME. *
Headset does not become silent after all customers have been served.	VERRIDE/RESET switch on base station is in the OVERRIDE position.	Place switch in the NORMAL position.
	Vehicle detector is locked up.	Press OVERRIDE/RESET switch twice.
Battery charger not working.	Charger not plugged in.	Plug in battery charger. If still not working, call HME. *
Can not record message.	Message repeater not turned on.	Turn message repeater on.
Message will not play.		

\* For assistance, call HME at 1-800-848-4468, or Fax 858-552-0172.

**In the event of an electrical power outage —**  
such as from a lightning storm or power generator failure, if you experience problems with your HME equipment after the electricity comes on again, unplug the AC power adapters from their electrical outlets, then plug them back in.

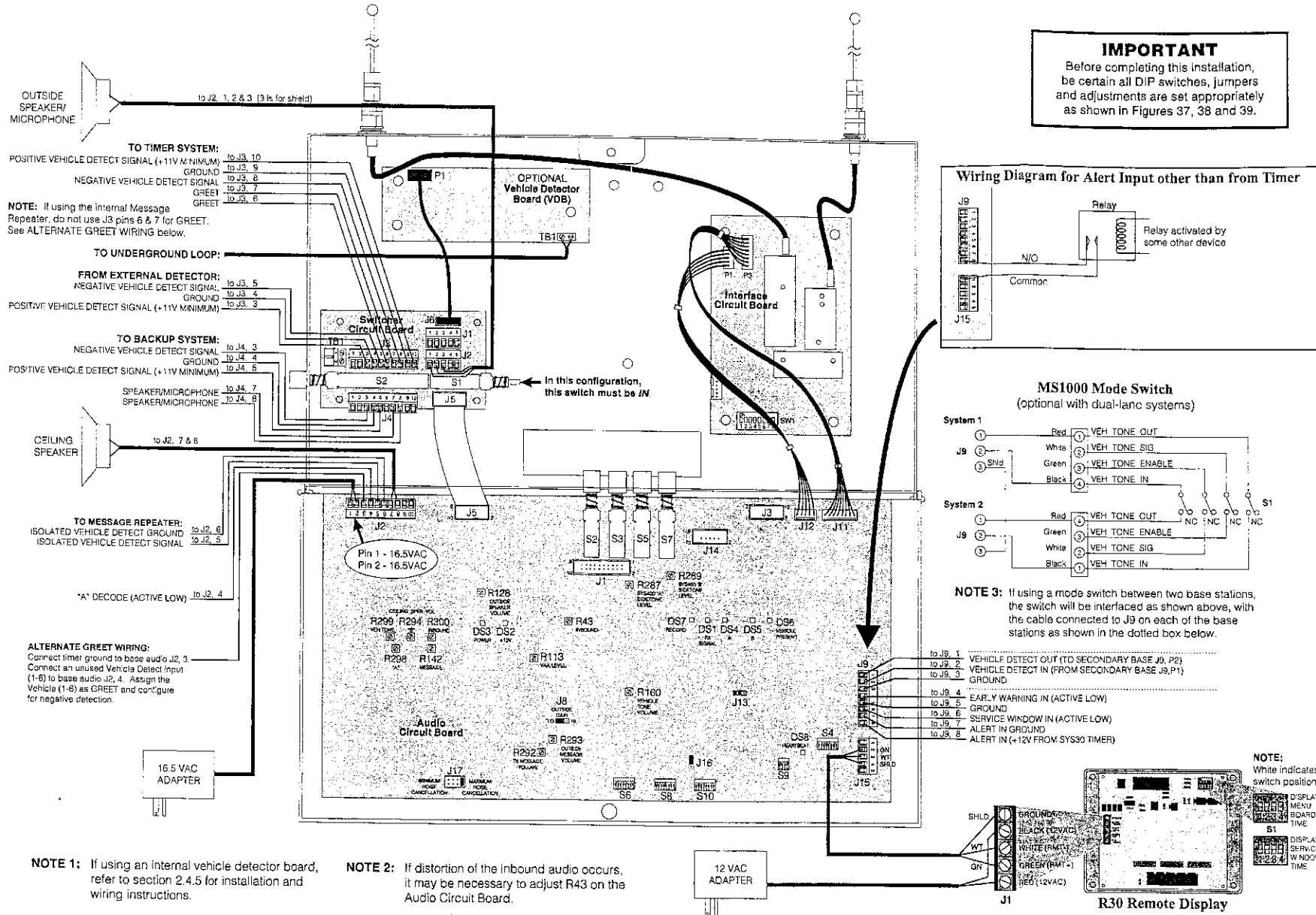


Figure 35.

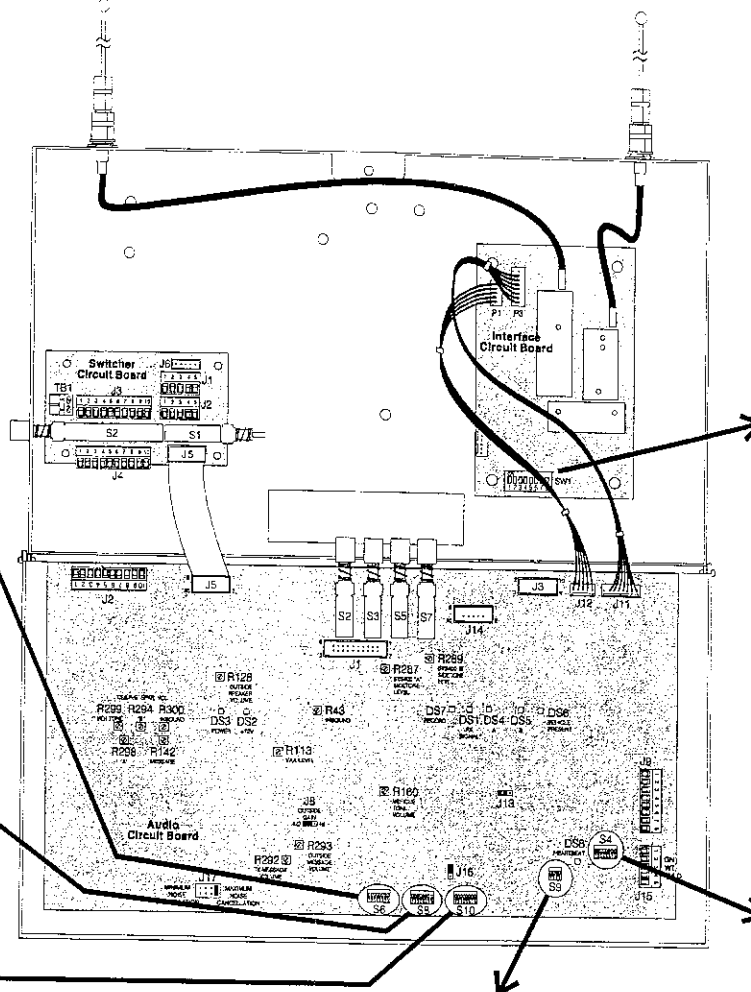
Wiring Diagram for Half-Duplex System 400



S6 - Switch Functions	
Switch	Function
1	ON - Full-Duplex operation OFF - Half-Duplex operation
2	ON - Communicator "A" audio played over ceiling speaker OFF - Communicator "A" audio NOT played over ceiling speaker
3	ON - Communicator "B" audio played over ceiling speaker OFF - Communicator "B" audio NOT played over ceiling speaker
4	ON - Inbound audio from drive-thru lane played over ceiling speaker OFF - Inbound audio from drive-thru lane NOT played over ceiling speaker
5	ON - Vehicle present tone played over ceiling speaker OFF - Vehicle present tone NOT played over ceiling speaker
6	ON - Vehicle early warning tone played over ceiling speaker OFF - Vehicle early warning tones NOT played over ceiling speaker
7	ON - Vehicle present tone repeats every 4 seconds until "A" button is pushed OFF - Vehicle present tone plays only once
8	ON - Vehicle present tone allowed to play when vehicle arrives OFF - Vehicle present tone NOT allowed to play when vehicle arrives

S8 - Switch Functions	
Switch	Function
1	ON - Allow inbound audio while message #1 is playing OFF - DO NOT allow inbound audio while message #1 is playing
2	ON - Transmit message #1 to Communicators OFF - DO NOT transmit message #1 to Communicators
3	ON - Send message #1 to outside speaker OFF - DO NOT send message #1 to outside speaker
4	ON - Send message #1 to ceiling speaker OFF - DO NOT send message #1 to ceiling speaker
5	ON - Trigger message #1 from alert input OFF - Trigger message #1 from vehicle present input
6	ON - Vehicle present tone is high pitched OFF - Vehicle present tone is low pitched
7	ON - 3 second delay OFF - No delay
8	Not used

S10 - Switch Functions	
Switch	Function
1	ON - Allow inbound audio while message #2 is playing OFF - DO NOT allow inbound audio while message #2 is playing
2	ON - Transmit message #2 to Communicators OFF - DO NOT transmit message #2 to Communicators
3	ON - Send message #2 to outside speaker OFF - DO NOT send message #2 to outside speaker
4	ON - Send message #2 to ceiling speaker OFF - DO NOT send message #2 to ceiling speaker
5	ON - Trigger message #2 from alert input OFF - Trigger message #2 from vehicle present input
6	Not used
7	ON - 3 second delay OFF - No delay
8	Not used



Synthesizer Frequency Selection Switch in System 400 Base Station					
Receive Frequency	SW1 DIP Switch Settings				
	1	2	3	4	
468.4875	OFF	OFF	OFF	OFF	
468.7625	ON	OFF	OFF	OFF	
468.8375	OFF	ON	OFF	OFF	
469.1375	ON	ON	OFF	OFF	
469.4625	OFF	OFF	ON	OFF	
469.6375	ON	OFF	ON	OFF	
469.6625	OFF	ON	ON	OFF	
469.8875	ON	ON	ON	OFF	
Transmit Frequency	SW1 DIP Switch Settings				
	5	6	7	8	
	457.5125	OFF	OFF	OFF	OFF
	457.5375	ON	OFF	OFF	OFF
	457.5625	OFF	ON	OFF	OFF
457.5875	ON	ON	OFF	OFF	
457.6125	OFF	OFF	ON	OFF	

S4 - Subaudible Tone, Mute "A" Sidetone, VAA, ClearSound	
Switch	Function
1	OFF
2	OFF
3	OFF
4	ON
5	OFF
6	Not used
7	ON - Voice activated attenuator (VAA) turned OFF OFF - Voice activated attenuator (VAA) turned ON
8	ON - ClearSound turned ON OFF - ClearSound turned OFF

S9 - Switch Functions	
Switch	Function
1	ON - Turn ON RS485 termination OFF - Turn OFF RS485 termination
2	ON - Turn ON RS485 biasing power OFF - Turn OFF RS485 biasing power
3	Not used

NOTE: If S8 switch 5 and S10 switch 5 are both set to ON or OFF, Message #1 and Message #2 will be played alternately.

System 400 Base Station Circuit Board DIP Switch Functions

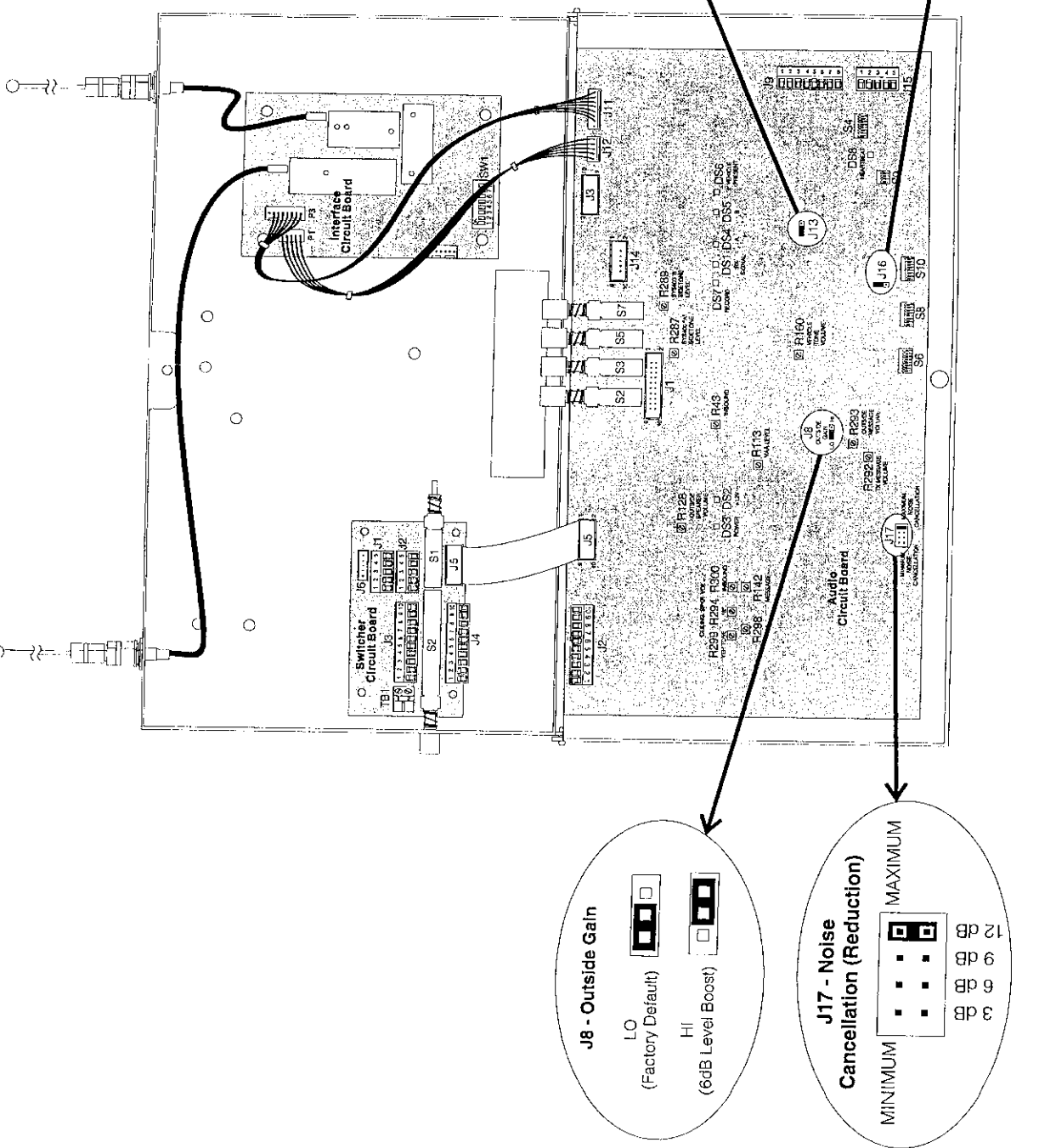


Figure 38.

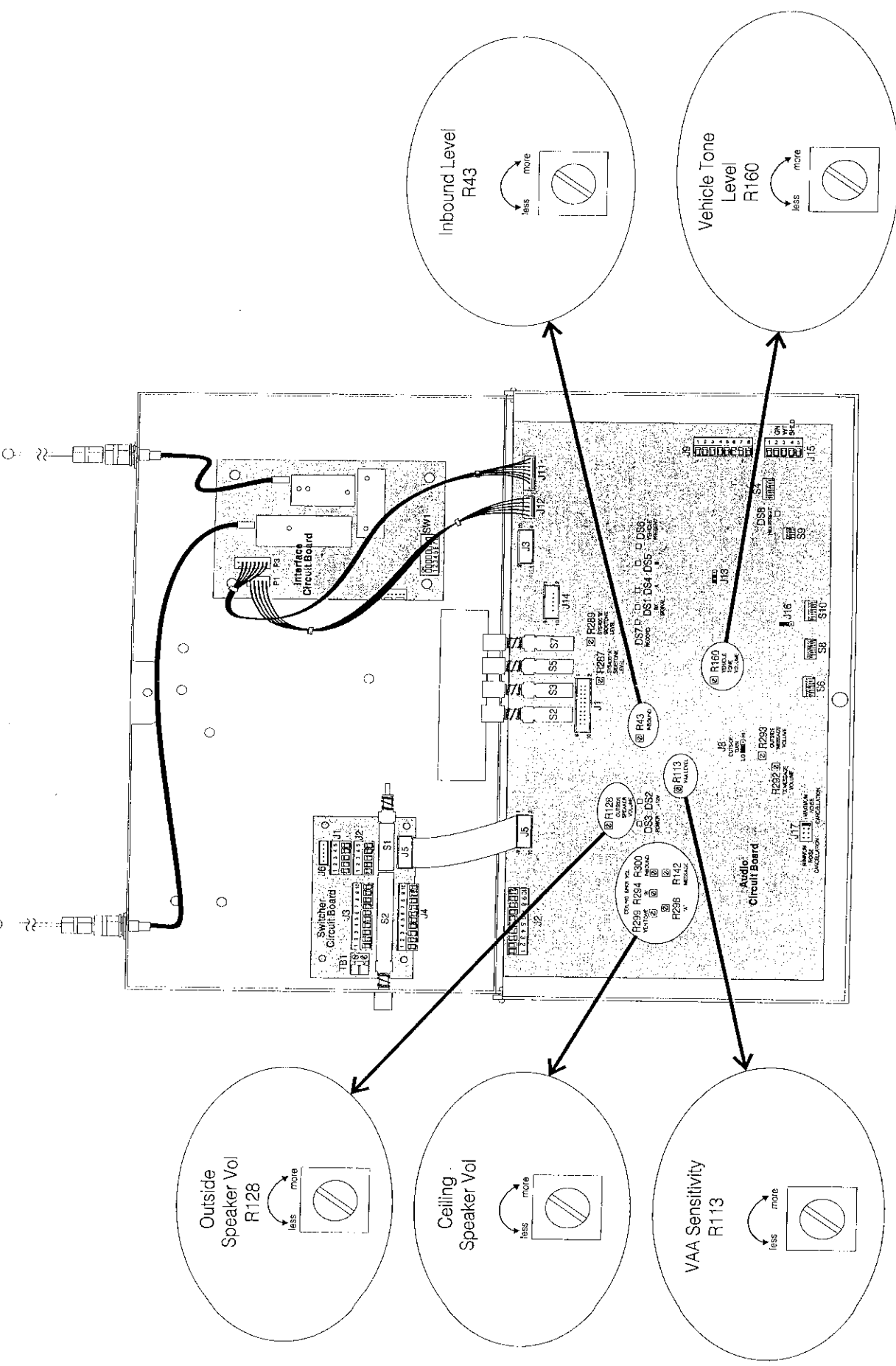


Figure 39.

## APPENDIX A: SYSTEM 400 INTERFACE DESCRIPTION

### Audio Circuit Board

#### J1 - ATE connector

J1,1	Speaker/Microphone
J1,2	Speaker/Microphone
J1,3	Vehicle 2 tone force (active low)
J1,4	Vehicle present (active low)
J1,5	Vehicle detector power
J1,6	Vehicle 1 tone force (active low)
J1,7	B force (active high)
J1,8	B decode (active high)
J1,9	Ground
J1,10	+5VDC
J1,11	+3.3VDC
J1,12	+12VDC
J1,13	A decode (active high)
J1,14	A force (active high)
J1,15	+22VDC
J1,16	Ceiling speaker out
J1,17	Receiver audio
J1,18	Transmitter/Receiver audio ground
J1,19	Transmitter audio
J1,20	Transmitter tone

#### J2 - Power connector

J2,1	16.5 VAC
J2,2	16.5 VAC
J2,3	Ground
J2,4	A decode (active low)
J2,5	Vehicle detector signal (active low)
J2,6	Vehicle detector ground
J2,7	Ceiling speaker (+)
J2,8	Ceiling speaker (-)
J2,9	No connection
J2,10	No connection



### **J5 - Switcher board interface cable connector**

J5,1	Speaker/Microphone
J5,2	Speaker/Microphone
J5,3	Ground
J5,4	+12VDC
J5,5	Positive vehicle detect input
J5,6	Negative vehicle detect input
J5,7	Vehicle detector power
J5,8	No connection
J5,9	Outside speaker -
J5,10	Outside speaker +

### **J8 - Outbound gain select jumper**

J8,1	Gain HI
J8,2	Common
J8,3	Gain LO

### **J9 - Secondary base/auxiliary detector interface connector**

J9,1	Vehicle detector out (active low)
J9,2	Vehicle detector in (active low)
J9,3	Ground
J9,4	Early warning in (active low)
J9,5	Ground
J9,6	Service window in (active low)
J9,7	Ground
J9,8	Alert in (Active High)

### **J11 - Transceiver board interface connector**

J11,1	Ground
J11,2	+8VDC
J11,3	Squelch voltage
J11,4	Squelch adjustment
J11,5	Receiver signal
J11,6	No connection
J11,7	Receiver audio
J11,8	No connection

### **J12 - Transceiver board interface connector**

J12,1	Ground
J12,2	+8VDC
J12,3	Transmit tone
J12,4	Transmit audio
J12,5	Ground

**J13 - System 400 jumper**

(remains in this position for System 400)

J13,1	No connection
J13,2	Common
J13,3	Normal position

**J14 - Auxiliary transceiver interface connector**

J14,1	Transmitter audio
J14,2	"A" force (active high)
J14,3	"B" force (active high)
J14,4	System active (active high)
J14,5	+22VDC
J14,6	Ground
J14,7	"B" decode (active high)
J14,8	"A" Decode (active high)
J14,9	No connection
J14,10	Receiver audio

**J15 - RS485 interface connector**

J15,1	+22VDC
J15,2	Remote +
J15,3	Remote -
J15,4	Ground
J15,5	No connection

**J16 - AVC ON/OFF select jumper**

J16,1	AVC OFF
J16,2	Common
J16,3	AVC ON

**J17 - Noise Cancellation select jumper**

J17,1	3dB (Minimum)
J17,2	6dB
J17,3	9dB
J17,4	12dB (Maximum)

## Switcher Circuit Board

### J1 - DM1 Interconnect

J1,1	Mic in
J1,2	Mic in
J1,3	Ground
J1,4	+12VDC
J1,5	No connection

### J2 - Menu Board Interconnect

J2,1	Speaker/Mic in/out
J2,2	Speaker/Mic in/out
J2,3	Ground
J2,4	Speaker out
J2,5	Speaker out

### J3 - Detector/Timer Interconnect

J3,1	Loop
J3,2	Loop
J3,3	Positive vehicle detect signal (active high)
J3,4	Ground
J3,5	Negative vehicle detect signal (active low)
J3,6	Greet
J3,7	Greet
J3,8	Negative vehicle detect signal (active low)
J3,9	Ground
J3,10	Positive vehicle detect signal (active high)

### J4 - Backup System Interconnect

J4,1	Loop
J4,2	Loop
J4,3	Negative vehicle detect signal (active low)
J4,4	Ground
J4,5	Positive vehicle detect signal (active high)
J4,6	No connection
J4,7	Speaker/Mic in/out
J4,8	Speaker/Mic in/out
J4,9	+12VDC to +48VDC in
J4,10	+12VDC to +48VDC in

### **J5 - Audio board interface cable connector**

J5,1	Speaker/Mic
J5,2	Speaker/Mic
J5,3	Ground
J5,4	+12VDC
J5,5	Positive vehicle detect
J5,6	Negative vehicle detect
J5,7	Vehicle detector power
J5,8	No connection
J5,9	Outside speaker -
J5,10	Outside speaker +

### **J6 - Vehicle Detector Board (VDB) interconnect**

J6,1	Vehicle detect signal
J6,2	Vehicle detect power
J6,3	Ground
J6,4	No connection
J6,5	No connection

## **Transceiver Circuit Board**

### **P1 - Audio board interface cable connector**

P1,1	Ground
P1,2	+8VDC
P1,3	Transmit tone
P1,4	Transmit audio
P1,5	Ground

### **P3 - Audio board interface cable connector**

P3,1	Ground
P3,2	+8VDC
P3,3	Squelch voltage
P3,4	Squelch adjustment
P3,5	Receiver signal
P3,6	No connection
P3,7	Receiver audio
P3,8	No connection

## **Vehicle Detector Board**

### **J1 - Audio board interface cable connector**

J1,1	Signal (for audio board interface)
J1,2	Power (for audio board interface)
J1,3	Ground (for audio board interface)

### **TB1 - Vehicle detector loop connector**

## **APPENDIX B: FUNCTIONAL DESCRIPTION OF BLOCK DIAGRAM**

The base station is the main control and interface of the System 400. All audio to and from the speaker post and COMMUNICATOR® routes through the base station. The base station contains the following circuit boards: audio board, transceiver board, switcher board and optional vehicle detector board.

### **Audio Board**

The audio board contains all of the microphone and speaker amplifiers, as well as the power supplies and A and B channel decoders. The A and B decode signals are used by the audio board to route the audio signals. The ceiling speaker is connected directly to the board.

### **Transceiver Board**

The transceiver board contains the RF transmitter and receiver, which allow communication with the Communicators.

### **Vehicle Detector Board**

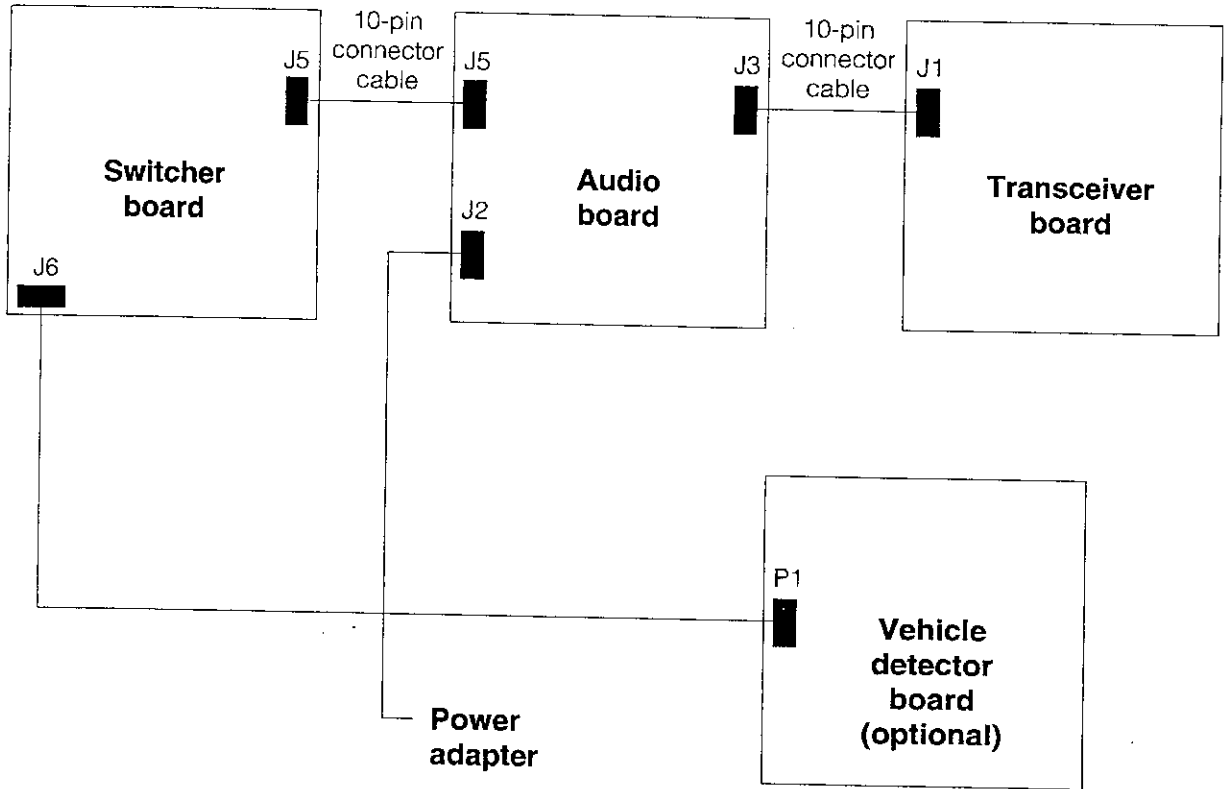
The vehicle detector board is used to generate a vehicle-presence output from an inductive loop. The output of this board is connected to the switcher board, which activates the base station for drive-thru operation.

### **Switcher Board**

The outside speaker/microphone lines are routed to a switch matrix on this board. The microphone input and speaker output (half-duplex mode) from the audio board are also routed to this matrix. The board also contains the necessary connections and a switch for an emergency backup system. It also provides the necessary connections for an external vehicle detector.

Figure B-1.

### System 400 Base Station Block Diagram



**AC910 Battery Charger** (for COM400BP NiCd and COM400CC NiMH batteries)

1. Voltage input: 16.5VAC
2. Number of charge ports: 4 for COM400CC NiMH batteries  
2 for COM400BP NiCd batteries
3. Charge time: 2 hours for COM400CC NiMH batteries  
4-8 hours for COM400BP NiCd batteries
4. Dimensions: 7.5"L x 7.5"W x 3<sup>7</sup>/<sub>8</sub>"D (191mm x 191mm x 78mm)
5. Weight: 31.94 oz (.906Kg)
6. Indicators: Battery-charging (red) LEDs, 6 ea  
Battery-ready (green) LEDs, 6 ea

**AC930 Battery Charger** (for COM430BP NiCd and HS30 Headset NiMH batteries)

1. Voltage input: 16.5VAC
2. Number of charge ports: 4 for HS30 NiMH batteries  
2 for COM430BP NiCd batteries
3. Charge time: 2-3 hours for COM430 headset NiMH batteries  
4-8 hours for COM400BP belt-pac NiCd batteries
4. Dimensions: 7.5"L x 7.5"W x 3<sup>7</sup>/<sub>8</sub>"D (191mm x 191mm x 78mm)
5. Weight: 29.10 oz (.825Kg)
6. Indicators: Battery-charging (red) LEDs, 6 ea  
Battery-ready (green) LEDs, 6 ea

## APPENDIX D: SP2000A SPEAKER/MICROPHONE INSTALLATION

### Installation:

Drill four 1/8 inch (3.2 mm) pilot holes at the spots shown on Figure D-1 A, in the flange of the SP2000A.

Hold the enclosed SP2000A mounting template against the outside of the speaker grill on the speaker post or menu board, at the desired location. With a pencil or other sharp object, mark the speaker grill through the four drill-hole targets on the template. Drill a 3/16 inch (4.8 mm) hole at each of the marked spots.

Hold the SP2000A flush against the inside of the speaker grill, with the four pilot holes on its flange directly over the four holes drilled through the grill speaker. From the outside of the speaker grill, drill the four enclosed self-tapping screws through the drilled holes in the speaker grill and through the SP2000A flange at each pilot hole, as shown in Figure D-1 B.

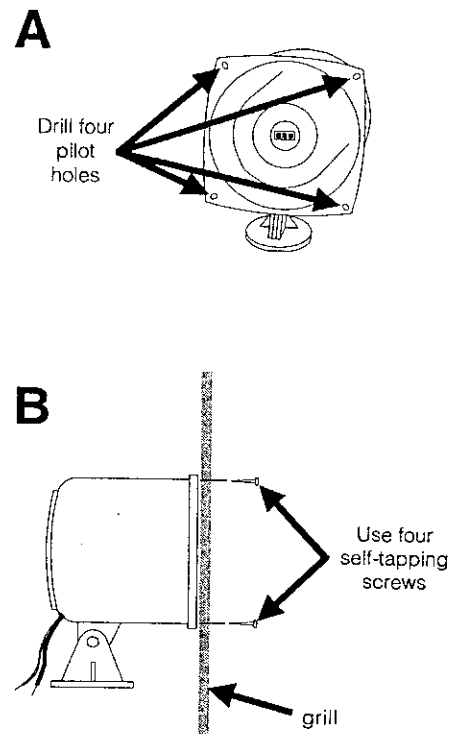


Figure D-1.  
Installing the SP2000A

### Cable Connections:

**CAUTION: Never run high-voltage cables in the same conduit with audio or loop cables.**

Connect the red wire from the appropriate cable to the white SP2000A wire, and the black cable wire to the black SP2000A wire as shown in Figure D-2. Do not connect the drain wire. Solder the connection and cover it with electrical tape or shrink tubing. Solder all splices to prevent deterioration of performance.

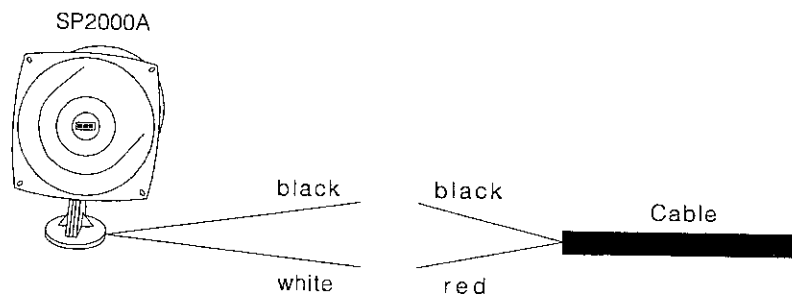


Figure D-2. SP2000A cable connections



## APPENDIX E: DM1 MICROPHONE INSTALLATION

The following instructions are for installation of the DM1 Microphone in standard, full-duplex installations, both inside and outside a speaker post or menu board. Specific installation requirements may vary. Refer to wiring diagrams on pages A-15 and A-16 for cable connections.

In order to avoid audio feedback, the speaker unit must be mounted at least 2 feet (610 mm) from the microphone unit. Positioning of the two units is critical. Install the microphone unit before the speaker unit, so it can be positioned where the customer will be speaking directly into it. The speaker unit can then be installed anywhere around the microphone unit, as long as they are at least 2 feet (610 mm) apart, center-to-center. This distance may vary according to specific conditions.

**NOTE:** Try the system with the speaker unit at various locations before permanently mounting it. If it is not positioned correctly, feedback may occur. If this happens, reposition the speaker at other locations around the microphone unit until the feedback disappears. If possible, park a vehicle in front of the post to simulate echo conditions that may also cause feedback.

### 1. To Install the DM1 Microphone Inside a Speaker Post or Menu Board

Typical DM1 Microphone installation involves mounting it inside the upper compartment of the SPP2 speaker post. The microphone unit must be mounted against the inside of the speaker grill. The four enclosed pre-cut foam pieces are made to fit around the DM1 in many types of speaker posts and menu boards. If the unit must be mounted in a small area, compress the foam when installing it and closing the speaker post or menu board. In larger areas, additional foam (not supplied) can be added. To install the DM1 in a typical SPP2 speaker post, refer to Figures E-1 and E-2 and follow these instructions.

If the DM1 needs to be mounted on top a speaker post or on the outside of a menu board, refer to sections 2 or 3.

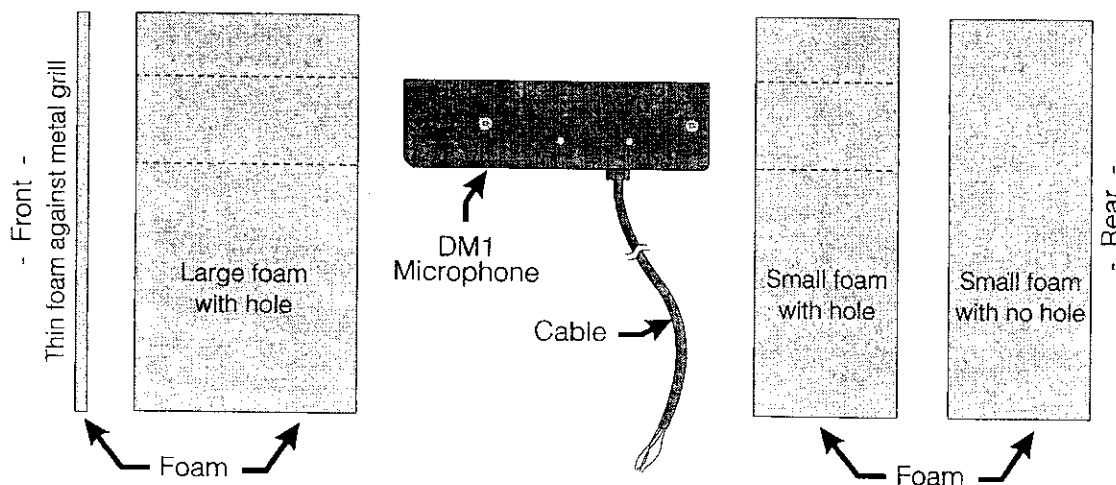
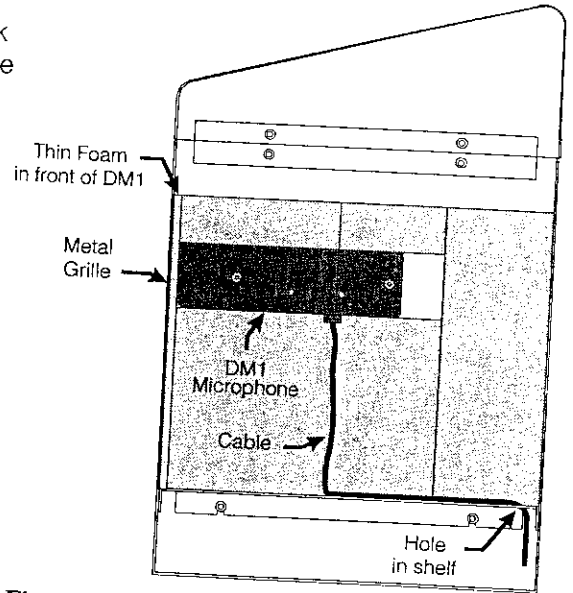


Figure E-1. Sequence of DM1 and foam inserts in speaker post or menu board

- Remove the rubber plug from the back of the DM1 microphone unit, and locate the POT inside the hole. Turn the POT approximately  $\frac{3}{4}$  of the way clockwise, then replace the rubber plug.
- Place the enclosed thin piece of foam against the inside of the metal grille.
- Place the DM1 Microphone into the holes on the large and small pieces of foam with holes, in the positions shown in Figures E-1 and E-2.
- Place the DM1 in the two pieces of foam into the upper compartment of the speaker post, against the thin piece of foam already in place.
- Route the DM1 cable down through the hole in the shelf as shown in Figure E-2.
- Place the remaining piece of foam (with no hole in it) against the other foam in the upper compartment of the SPP2 speaker post.
- Splice the DM1 cable wires to the audio cable wires according to the color codes shown in the appropriate wiring diagram on pages A-15 and A-16.

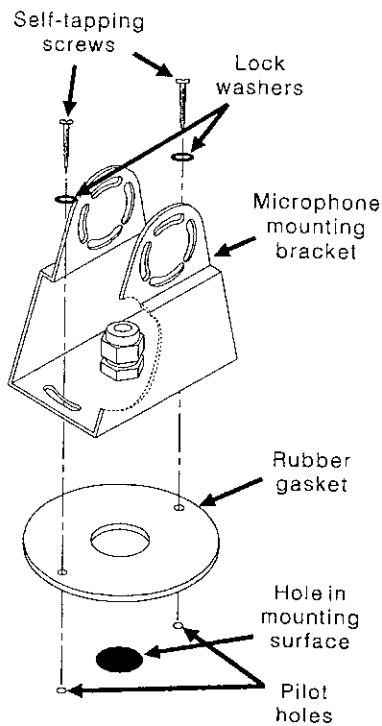


**Figure E-2. DM1 and foam inserts shown in typical SPP2 speaker post installation**

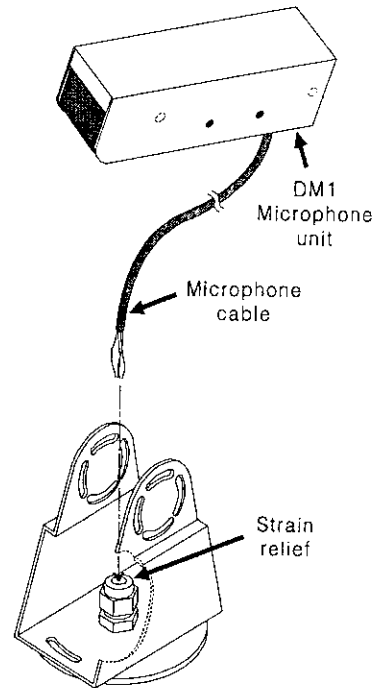
- In retrofit installations, splice the DM1 cable wires to the audio cable wires that are disconnected from the removed speaker, according to the color codes shown in the appropriate wiring diagram on pages A-15 and A-16.
- Close the speaker post, replacing all screws that were removed from the back cover.

**2. To install the DM1 Microphone on top of a speaker post, mount the DM1 as follows.**

- Disconnect the microphone cable from the existing SP2000A Microphone Unit or SP2000D Speaker/Microphone in the speaker post.
- Determine the best location for mounting the DM1 Microphone on top of the speaker post. For best performance, it should be 42 to 46 inches (1.07 to 1.17 meters) above the drive-thru lane.
- Drill a  $\frac{3}{16}$  inch (4.76 mm) hole through the selected mounting surface and center the enclosed rubber gasket over the hole, with the two screw holes in the gasket to the front and rear of the position the microphone will face as shown in Figure E-3. Mark the mounting surface through the two screw holes.
- Using a  $\frac{1}{10}$  inch (2.54 mm) drill bit (approximate), drill a pilot hole through the mounting surface at each of the marked spots.
- Center the rubber gasket over the three holes and place the microphone mounting bracket over the gasket. Place one of the enclosed lock washers and self-tapping screws through the screw slot at the front of the bracket and the screw hole in the gasket below it as shown in Figure E-3. Using a high-speed drill, drill the screw through the mounting surface to secure the bracket in place. Do not over tighten the screw, or the metal bracket could be damaged. Secure the rear of the bracket in place with the remaining washer and screw in the same manner.
- Route the 6 foot (152 mm) DM1 Microphone cable all the way through the hole in the mounting bracket strain relief as shown in Figure E-4.

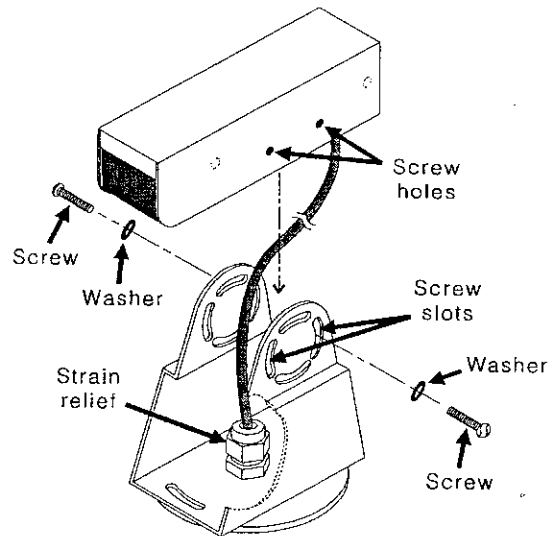


**Figure E-3. Installing gasket and bracket**



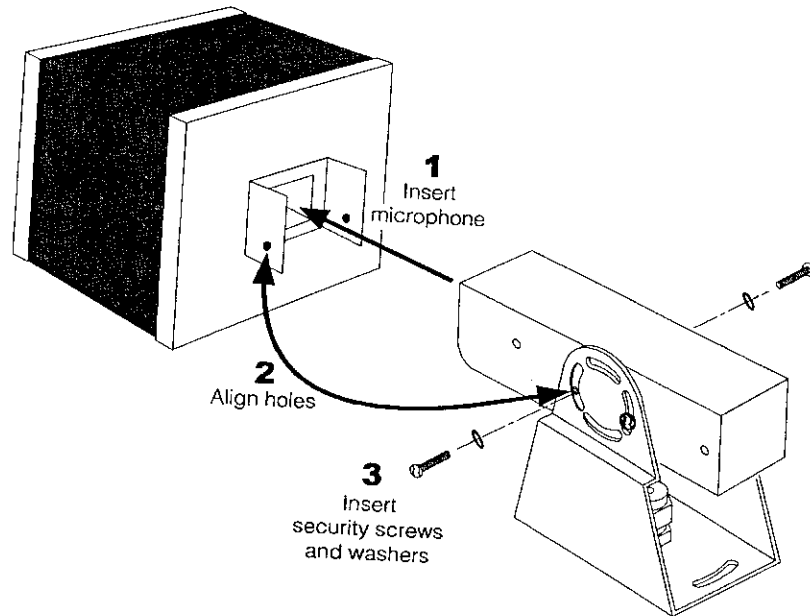
**Figure E-4. Routing cable through strain relief**

- Position the DM1 Microphone unit between the sides of the bracket and align the two holes in the unit with the two slots on the bracket. Fasten the unit in place with two of the four remaining lock washers and screws, inserting the screws into the holes toward the rear of the microphone as shown in Figure E-5.
- Pull any slack cable down below the mounting surface, leaving just enough to position the microphone as required, and tighten the nut on the strain relief below the microphone as seen in Figure E-5.
- Strip and splice the color-coded wires of the existing microphone cable to the corresponding color-coded wires of the DM1 Microphone cable. Solder all splices and cover them with electrical tape or heat shrink tubing.



**Figure E-5. Mount microphone on bracket**

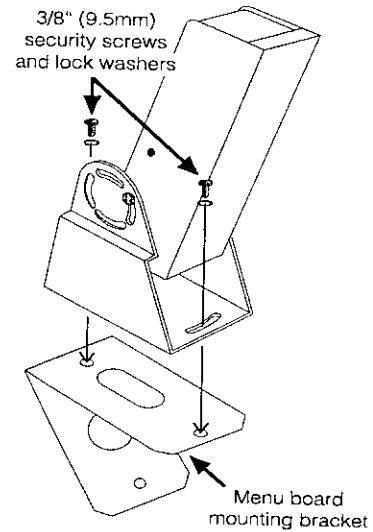
- Insert the front end of the microphone into the foam-lined hole in the windscreen so the screw holes on the windscreen flanges are aligned with the holes on the sides of the microphone mounting bracket as shown in Figure E-6.
- Place the two screws and washers through the holes on the windscreen and mounting bracket, into the screwholes on the sides of the microphone unit as shown in Figure E-6. Use a standard (slotted) screwdriver to tighten the screws in place.



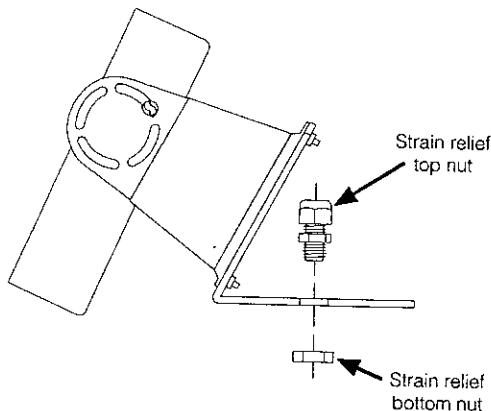
**Figure E-6. Install windscreen on microphone**

3. To install the DM1 Microphone on the outside of a menu board, use the menu-board mounting bracket to mount the DM1 as follows.

- Disconnect the microphone cable from the existing SP2000A Microphone Unit or SP2000D Speaker/Microphone in the menu board.
- Determine the best location for mounting the DM1 Microphone on the outside of the menu board. For best performance, it should be 42 to 46 inches (1.07 to 1.17 meters) above the drive-thru lane.
- Attach the menu-board mounting bracket to the DM1 as shown in Figure E-7.
- Install the strain relief on the menu board mounting bracket as shown in Figure E-8, and route the cable through the strain relief. Pull any slack cable down through the bracket, leaving just enough to allow the microphone to be rotated up and down, and tighten the nut on the strain relief below the microphone.

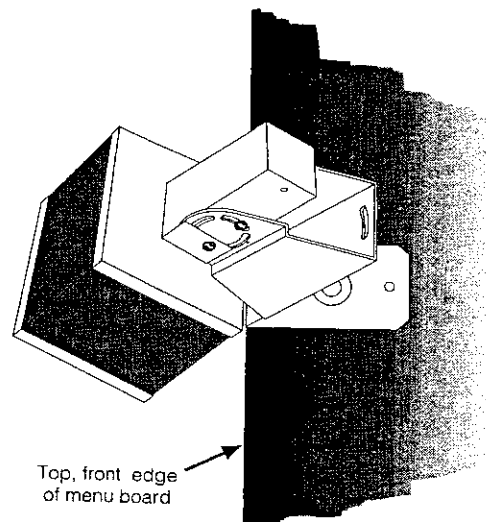


**Figure E-7.**  
Attach mounting bracket



**Figure E-8.** Install strain relief

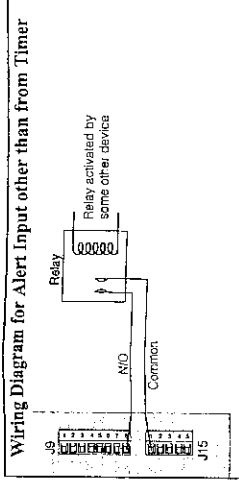
- Mount the microphone on the menu board as shown in Figure E-9.
- Install the windscreen on the microphone as shown in Figure E-6.
- Strip and splice the DM1 cable wires to the audio (microphone) cable wires coming through the conduit from the building, according to the color codes shown on the appropriate wiring diagram in Figures E-10 and E-11. Solder all splices and cover them with electrical tape or heat shrink tubing.



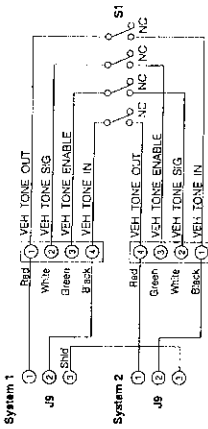
**Figure E-9.** DM1 Microphone  
mounted on top of menu board

**IMPORTANT**  
MICROPHONE AND SPEAKER  
MUST USE SEPARATE CABLES

**IMPORTANT**  
Before completing this installation,  
be certain all DIP switches, jumpers  
and adjustments are set appropriately  
as shown in Figures 37, 38 and 39.



**MS1000 Mode Switch**  
(optional with dual-lane systems)



**NOTE 2:** If using a mode switch between two base stations,  
the switch will be interfaced as shown above, with  
the cable connected to J9 on each of the base  
stations as shown in the dotted box below.

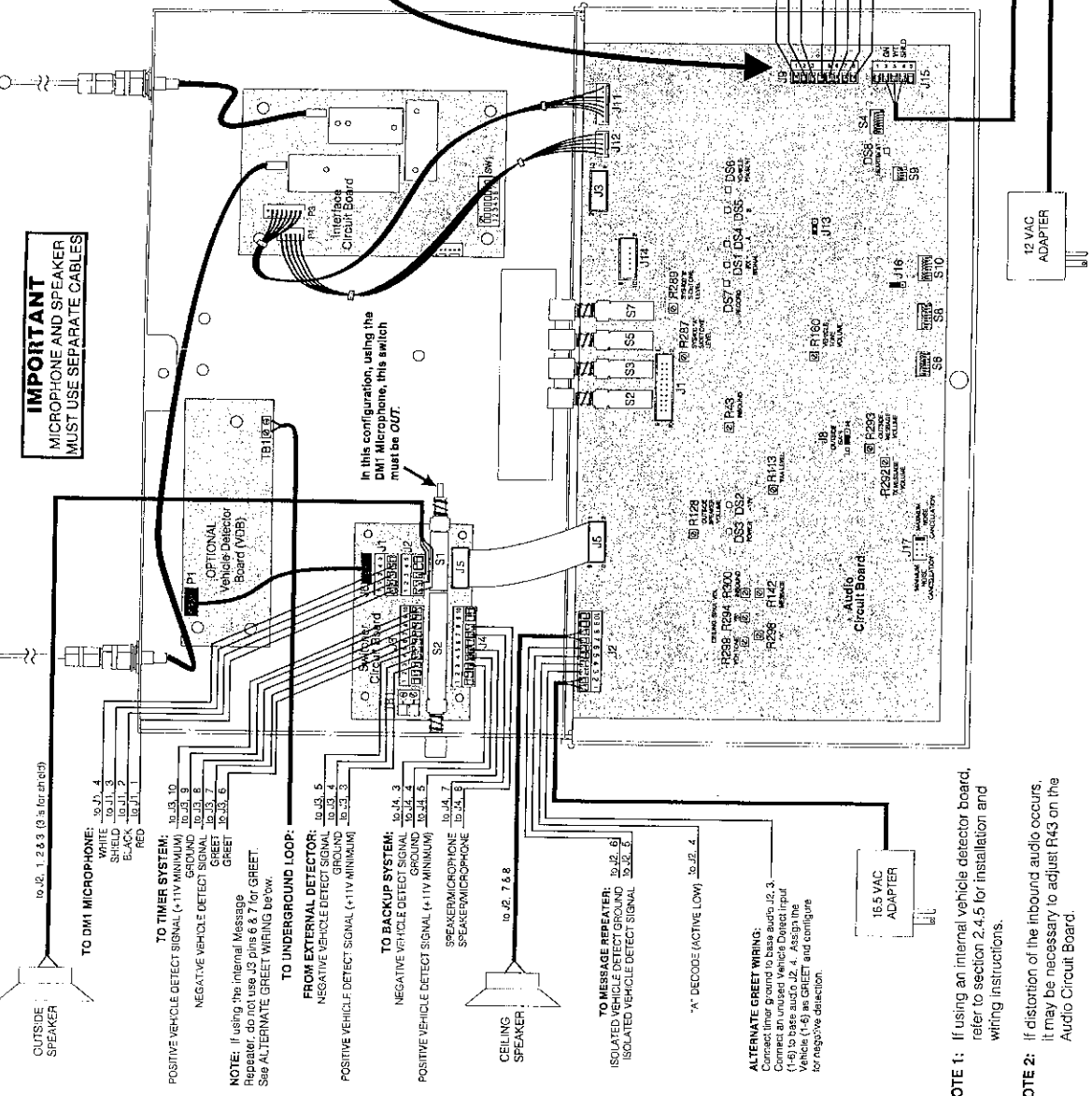
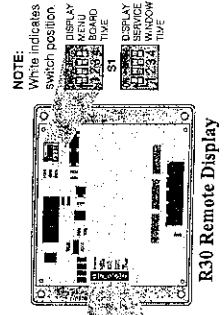
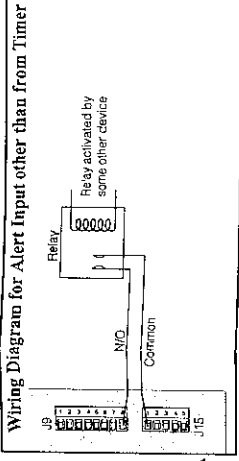


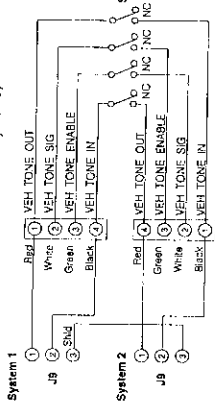
Figure E-10. A-17

**IMPORTANT**  
Before completing this installation, be certain all DIP switches, jumpers and adjustments are set appropriately as shown in Figures 37, 38 and 39.

**IMPORTANT**  
MICROPHONE AND SPEAKER MUST USE SEPARATE CABLES

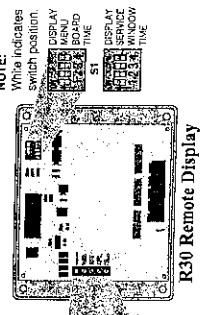


**MS1000 Mode Switch**  
(optional with dual-lane systems)

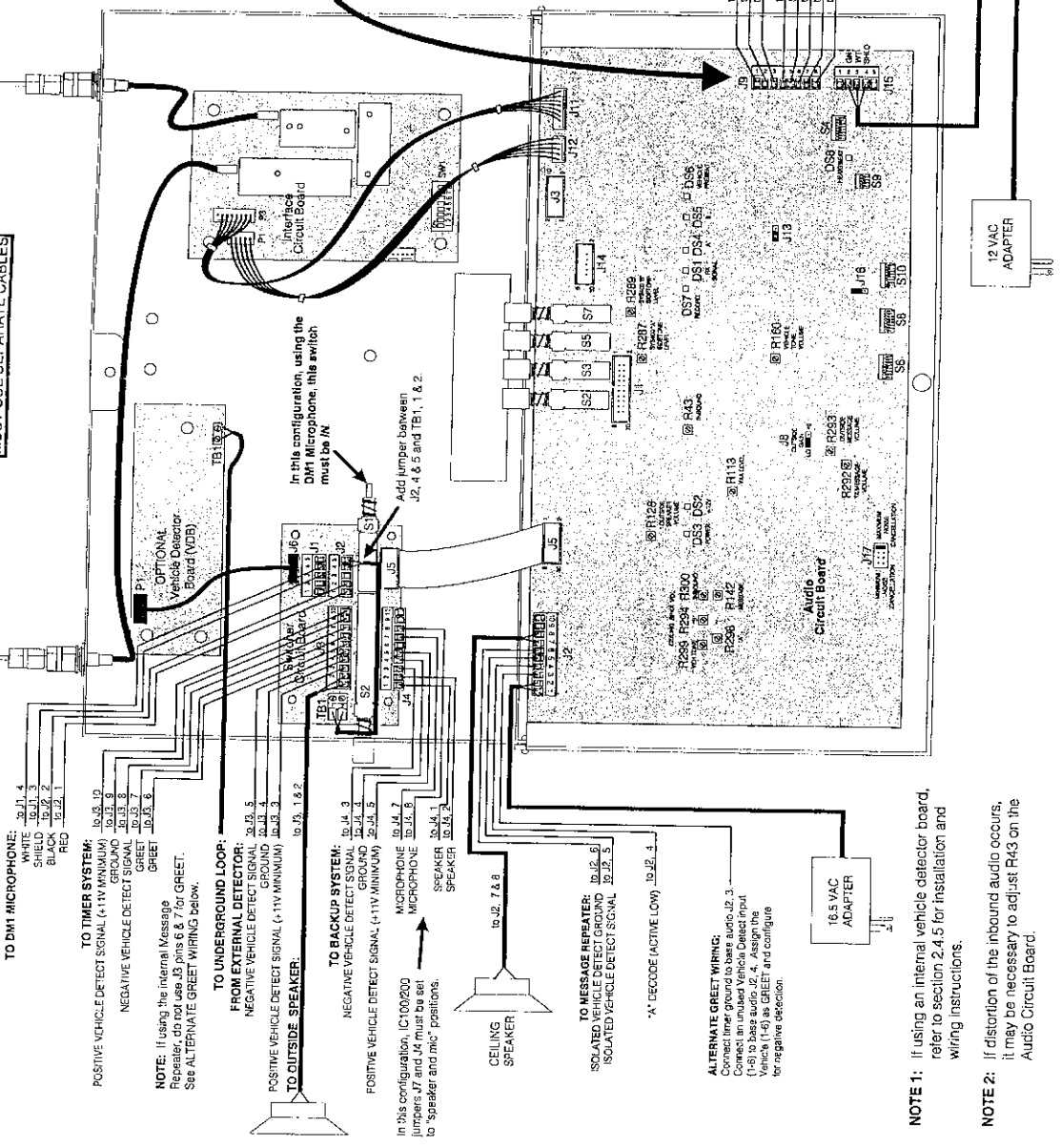


**NOTE 3:** If using a mode switch between two base stations, the switch will be interfaced as shown above, with the cable connected to J9 on each of the base stations as shown in the dotted box below.

- 10.J9.1 VEHICLE DETECT OUT (TO SECONDARY BASE J9.P2)
- 10.J9.2 VEHICLE DETECT IN (FROM SECONDARY BASE J9.P1)
- 10.J9.3 GROUND
- 10.J9.4 EARLY WARNING IN (ACTIVE LOW)
- 10.J9.5 GROUND
- 10.J9.6 EARLY WARNING IN (ACTIVE LOW)
- 10.J9.7 ALERT IN WINDOW IN (ACTIVE LOW)
- 10.J9.8 ALERT IN WINDOW IN (ACTIVE LOW)
- 10.J9.9 ALERT IN (C-12V FROM SYS30 TIMERS)



**Wiring Diagram for Full-Duplex System 400 with DMI Microphone and IC100 or IC200**



**NOTE 1:** If using an internal vehicle detector board, refer to section 2.4.5 for installation and wiring instructions.

**NOTE 2:** If distortion of the inbound audio occurs, it may be necessary to adjust R43 on the Audio Circuit Board.

Figure E-11.